

THE PHILIPPINE JOURNAL OF SCIENCE

VOL. 17

NOVEMBER, 1920

No. 5

STUDIES ON PHILIPPINE RUBIACEAE, IV

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In this fourth paper of the series¹ sixty-two new species are proposed in the genera *Gynochthodes*, *Hedyotis*, *Ixora*, *Morinda*, *Mussaenda*, *Ophiorrhiza*, *Pavetta*, *Plectronia*, *Psychotria*, *Randia*, *Tarenna*, *Timonius*, *Urophyllum*, and *Williamsia*. In this series, including the present paper, about one hundred sixty new species have been described. In the present paper, as in its predecessors, notes on nomenclature have been included, in the present contribution such notes being confined to those species proposed under the generic designations *Webera*, *Tarenna*, *Pavetta*, and *Stylocoryna*. An attempt has been made to distribute these between the genera *Tarenna* and *Pavetta*.

GYNOCHTHODES Blume

GYNOCHTHODES MINDANAENSIS sp. nov.

Frutex scandens, glaber, ramis ramulisque teretibus; foliis subcoriaceis, ellipticis ad oblongo-ellipticis, 6 ad 10 cm longis, utrinque subaequaliter angustatis, breviter acuminatis, basi acutis vel acuminatis, nervis utrinque circiter 6, tenuibus, reticulis obsoletis; inflorescentiis axillaribus, 2.5 ad 4 cm longis, 5- ad 9-floris, racemosis vel cymosis, vel umbellatis, calycis cupulatis, truncatis, 4 mm longis; corollae tubo 8.5 mm longo; fructibus late obovoideis, circiter 8 mm diametro, 4-locellatis.

A glabrous, woody vine, the branches and branchlets terete,

¹ Studies on Philippine Rubiaceae, I, Philip. Journ. Sci. 8 (1913) Bot. 31-62; II, op. cit. 10 (1915) Bot. 99-144; III, op. cit. 12 (1917) Bot. 159-176.

reddish brown to nearly black when dry. Leaves subcoriaceous, elliptic to oblong-elliptic, black when dry, 6 to 10 cm long, 2 to 4.5 cm wide, subequally narrowed to the acute or acuminate base and to the short-acuminate apex; lateral nerves slender, about 6 on each side of the midrib, the reticulations obsolete; petioles 1.5 to 2.5 cm long; stipules truncate, about 1 mm long. Inflorescences axillary, peduncled, 2.5 to 4 cm long, the terminal parts of the branches supplied with more or less reduced leaves and forming an elongated leafy inflorescence. Flowers 5 to 9 in each inflorescence, their pedicels up to 5 mm in length, the uppermost inflorescence sometimes reduced to a fascicle, others racemose or umbellate, and others cymose. Calyx cup-shaped, glabrous, truncate, 4 mm long. Corolla-tube 8 to 9 mm long, glabrous externally, the lobes spreading, oblong-ovate, obtuse, inside very densely white-villous. Style about 8 mm long. Anthers 2.5 to 3 mm long, linear-oblong. Fruits broadly obovoid, about 8 mm long and wide, slightly 4-sulcate, longitudinally 4-celled, black when dry.

MINDANAO, Surigao Province, *Bur. Sci.* 34677 (type), 34589 *Ramos & Pascasio*, April and June, 1919, on ridges at the iron deposit on the northeast coast, altitude 460 to 680 meters.

This species is distinctly different from the other representatives of this genus and of the allied genus *Tetralopha*, differing in its vegetative and inflorescent characters. I am now of the opinion that *Tetralopha* cannot be retained as generically distinct from *Gynochthodes*.

HEDYOTIS Linnaeus

HEDYOTIS ATROPURPUREA sp. nov.

Suffruticosa, erecta, circiter 1 m alta, parce ramosa, ramis obscure rotundato-angulatis sulcatisque, dense breviter et adpresse hirsutis; foliis ovatis ad oblongo-ovatis, utrinque scabris, coriaceis, usque ad 7 cm longis, acuminatis, basi acutis, in siccitate utrinque viridis, in vivo subtus et cum ramis inflorescentiisque atropurpureis; nervis primariis utrinque circiter 6, supra valde impressis, subtus perspicuis, curvato-adscendentibus; inflorescentiis terminalibus, paniculatis, pubescentibus, usque ad 18 cm longis, multifloris; floribus circiter 5 mm longis.

An erect, sparingly branched, suffrutescent plant, about 1 m high, prominently pubescent, the leaves scabrous. Branches 5 to 6 mm in diameter, obscurely rounded-angled, usually sulcate, the older parts brownish, nearly glabrous, the younger parts rather densely appressed-hirsute with short, greenish-olivaceous

hairs. Leaves coriaceous, ovate to oblong-ovate, 5 to 7 cm long, 2.3 to 4 cm wide, green on both surfaces when dry, when fresh deep purple beneath as are the branches and inflorescences, brittle, base rounded, apex acuminate, both surfaces scabrous from the short, scattered, hispid hairs; lateral nerves about 6 on each side of the midrib, prominent, curved-ascending, anastomosing, deeply impressed on the upper surface, both surfaces somewhat bullate; petioles 6 to 13 mm long, pubescent; stipules triangular-ovate, acuminate, sparingly toothed, pubescent, about 5 mm long. Inflorescence a somewhat leafy terminal panicle up to 18 cm long, rather prominently pubescent, the lower branches subtended by somewhat reduced leaves. Flowers numerous, somewhat corymbosely crowded on the branchlets, about 5 mm long, 4-merous, their pedicels pubescent, 5 mm long or less, the subtending bracteoles linear-lanceolate, 1.5 mm long. Calyx 2 mm long, the tube ovoid, terete, 1 mm long, the teeth as long as the tube, narrowly ovate, obtuse to acute, 1 mm long. Corolla-tube 2 mm long, the lobes narrowly ovate, obtuse, 1.3 mm long, the throat villous inside.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28578 *Ramos & Edaño*, May 7, 1917, on the forested summit of the mountain, altitude apparently about 1,000 meters.

This characteristic species is described by Ramos as having the stems, inflorescences, calyces, and the lower surface of its leaves dark-purple in color, but when dry the leaves are uniformly greenish on both surfaces. It is well characterized by its scabrous, ovate to oblong-ovate leaves, which are more or less bullate on both surfaces, its nerves deeply impressed on the upper surface and prominent beneath.

HEDYOTIS BRACHYANTHA sp. nov.

Suffruticosa, erecta, glabra, circiter 1 m alta, parce ramosa, ramis teretibus, ramulis leviter sulcatis; foliis lanceolatis, chartaceis vel submembranaceis, usque ad 12 cm longis, in siccitate pallidis, utrinque concoloribus, perspicue acuminatis, apice leviter falcatis, basi acutis ad decurrento-acuminatis, saepe inaequaliteralibus, nervis utrinque 6 ad 8, tenuibus, obscuris, arcuato-anastomosantibus, reticulis laxissimis, obscuris; inflorescentiis axillaribus, 1.5 ad 2 cm longis, pedunculatis, corymbosis, paucifloris; floribus circiter 3 mm longis.

An erect, sparingly branched, glabrous, smooth, suffrutescent plant, about 1 m high, the stems terete, grayish-brown, the branchlets somewhat sulcate. Leaves lanceolate, chartaceous or

submembranaceous, 9 to 12 cm long, 2 to 3 cm wide, rather pale and of the same color on both surfaces when dry, smooth, shining, narrowed upward to the rather prominently and somewhat falcate acuminate apex, the base often inequilateral, acute or decurrent-acuminate; lateral nerves 6 to 8 on each side of the midrib, slender, not prominent, curved, arched-anastomosing, the reticulations obscure, very lax; petioles about 1 cm long; stipules broad, 2 mm long or less, truncate, terminated by 2, short, stout teeth, rarely by 1. Inflorescences strictly axillary, 1.5 to 2 cm long, few-flowered, peduncled, corymbose. Flowers 4-merous, about 3 mm long, their pedicels 3 mm long, the subtending bracteoles linear, 1 to 2 mm long. Calyx-tube obovoid, terete, about 1.5 mm long, the teeth oblong, obtuse, less than 1 mm long. Corolla-tube 0.8 mm long, glabrous or nearly so within, the lobes narrowly ovate, obtuse, 1.2 mm long, slightly pubescent on the median portion within. Capsules subellipsoid, 4 mm long, terete.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28769 Ramos & Edaño, May 5, 1917, on forested slopes at medium altitudes.

In general appearance this species approximates *Hedyotis sibuyanensis* Elm., but differs especially in its strictly axillary, shorter inflorescences, shorter petioles, and much shorter flowers.

HEDYOTIS CATANDUANENSIS sp. nov.

Frutex glaber, ramis obtuse 4-angulatis; foliis ovatis ad oblongo-ovatis, membranaceis vel chartaceis, usque ad 13 cm longis, leviter acuminatis, basi rotundatis, nervis utrinque 7 vel 8, olivaceis, nitidis, reticulis laxis, tenuibus; stipulis 3-laciniatis, glabris; inflorescentiis terminalibus, foliaceis, ramis primariis usque ad 4 cm longis, capsulis obovoideis, circiter 2.5 mm longis.

A glabrous shrub, the branches obtusely 4-angled. Leaves ovate to oblong-ovate, membranaceous to chartaceous, brittle when dry, olivaceous, somewhat shining, smooth, 9 to 13 cm long, 4.5 to 6 cm wide, narrowed upward to the somewhat acuminate apex, the base rounded; lateral nerves 7 or 8 on each side of the midrib, slender, distinct, curved-ascending, anastomosing, the reticulations slender but rather distinct; petioles 1 to 1.5 cm long; stipules 3 to 5 mm long, deeply 3-cleft, glabrous. Inflorescences terminal, leafy, the nodes supplied with reduced, ovate, shortly sessile, somewhat cordate, 1.5 to 4 cm long leaves, the primary branches up to 4 cm in length, about as long as the internodes, the partial cymes 2 to 3 cm in diameter, the bracts oblong-lanceolate, up to 5 mm in length. Capsules obo-

void, about 2.5 mm long, their pedicels 3 mm long or less, the persistent calyx-teeth oblong-lanceolate, acute or somewhat acuminate, about 2 mm long.

CATANDUANES, Mount Mariguison, *Bur. Sci.* 30443 Ramos, November 17, 1917, on forested slopes.

This species is most closely allied to *Hedyotis caudata* Merr., from which it is readily distinguished by its larger leaves, which are not caudate-acuminate, and its entirely glabrous stipules.

HEDYOTIS DIFFUSISSIMA sp. nov.

Suffruticosa, erecta, glabra, 1 ad 1.5 m alta, ramis circiter 6 mm diametro, acute 4-angulatis vel anguste 4-alatis; foliis membranaceis, in siccitate obscure olivaceis, nitidis, oblongis ad oblongo-ellipticis, usque ad 16 cm longis, utrinque subaequaliter angustatis et acuminatis, nervis utrinque circiter 6, adscendentibus; inflorescentiis axillaribus, longissime pedunculatis, diffusissimis, usque ad 40 cm longis, laxis, floribus circiter 6 mm longis, tenuiter pedicellatis.

An erect, suffrutescent, slightly branched plant, 1 to 1.5 m high, glabrous throughout except the inside of the petals. Branches sharply 4-angled or narrowly 4-winged, dark-olivaceous when dry, smooth. Leaves membranaceous or at most chartaceous, in general oblong to oblong-elliptic, 11 to 16 cm long, 3 to 5.5 cm wide, dark-olivaceous and shining when dry, smooth, subequally narrowed to the acuminate base and apex, the apical acumen slender, acute; lateral nerves about 6 on each side of the midrib, prominent on the lower surface, curved, ascending; petioles about 2 cm long; stipules lanceolate to oblong-lanceolate, acuminate, margins irregularly lacerate, about 1.5 cm long. Panicles axillary, solitary, long-peduncled, lax, very diffuse, up to 40 cm in length, the primary branches few, the lower ones up to 12 cm in length, the peduncles up to 20 cm long and more or less 4-angled. Flowers comparatively few, white, 4-merous, about 6 mm long, the slender pedicels up to 1 cm in length, the bracteoles lanceolate, acuminate, about 2 mm long. Calyx-tube ovoid, somewhat 4-angled, 1.5 mm long, the lobes oblong-ovate, somewhat triangular, acute, keeled, 1.5 mm long. Corolla-tube 2 mm long, the lobes oblong-ovate, acute, 2.5 mm long, densely pubescent inside. Capsules ovoid, black when dry, 4 to 5 mm long.

LUZON, Apayao Subprovince, Mount Sulu, *Bur. Sci.* 28387 *Fénix*, May 22, 1917, on rocky forested slopes, altitude about 1,000 meters.

This most characteristic species is readily distinguishable by its very lax, diffuse, long-peduncled, axillary panicles, which attain a total length of about 40 centimeters. It does not closely resemble any other species known to me.

HEDYOTIS LAXIFLORA sp. nov.

Frutex erectus, glaber, circiter 1 m alta, ramis diffusis, sulcatis vel 4-angulatis, elongatis; foliis oblongo-ovatis, chartaceis, glabris, acutis vel breviter acuminatis, basi acutis, usque ad 4 cm longis, nervis utrinque 4 vel 5, tenuibus; stipulis circiter 3 mm longis, rigidis, profunde 3-lobatis; inflorescentiis axillari-bus, tenuibus, diffusis, paucifloris, 4 ad 5 cm longis; floribus circiter 7 mm longis; capsulis obovoideis, 4 mm longis.

An erect, glabrous, much-branched shrub, about 1 m high (*fide* Ramos), the branches elongated, diffuse, sulcate or 4-angled, rather slender, the main stem terete or very obscurely angled, smooth, dark-brownish to purplish-brown. Leaves oblong-ovate, chartaceous, glabrous, yellowish-green and slightly shining when dry, glabrous, smooth, 2 to 4 cm long, 10 to 18 mm wide, base acute, apex acute or slightly acuminate; lateral nerves 4 or 5 on each side of the midrib, slender, obscure; petioles 3 to 4 mm long; stipules rigid, about 3 mm long, deeply 3-lobed. Inflorescences axillary, solitary, numerous, diffuse, few-flowered, 4 to 5 cm long, the pedicels divaricately spreading; bracts linear-oblong, 3 to 4 mm long, the bracteoles much smaller. Corolla-tube about 3 mm long, glabrous externally, pubescent within, the lobes oblong-ovate, about 3.5 mm long, puberulent within. Calyx-lobes oblong, subacute, 1.5 mm long. Capsule obovoid, 4 mm long.

CATANDUANES, Mount Mariguison, *Bur. Sci.* 30303 Ramos, November 25, 1917, in forested ravines, altitude about 400 meters.

This characteristic species is probably as near *Hedyotis microphylla* Merr. as any other species, but is not closely allied to it. It is well characterized by being entirely glabrous; by its diffuse branches; its rather small leaves; and its diffuse, solitary, axillary, numerous, few-flowered inflorescences.

HEDYOTIS LONGIPEDUNCULATA sp. nov.

Frutex erectus, glaber, ramis ramulisque acute 4-angulatis; foliis chartaceis, oblongo-ovatis, usque ad 15 cm longis, laevis, nitidis, subolivaceis, subtus pallidioribus, utrinque leviter acuminatis, nervis utrinque 5 ad 7, vix prominulis, adscendentibus; stipulis oblongo-ovatis, acuminatis, laciniatis, circiter 6 mm

longis; cymis axillaribus, solitariis, longe pedunculatis, 8 ad 12 cm longis, ramis paucis, circiter 2 cm longis, fructibus breviter pedicellatis, circiter 3 mm longis.

An erect, glabrous shrub, the branches and branchlets acutely 4-angled. Leaves chartaceous, oblong-ovate, subolivaceous when dry, shining, the lower surface paler than the upper, 11 to 15 cm long, 2.5 to 5.5 cm wide, subequally narrowed to the slightly acuminate base and apex, or the latter merely acute, smooth; lateral nerves 5 to 7 on each side of the midrib, distinct, ascending, scarcely projecting, not at all impressed on the upper surface, the reticulations obsolete or nearly so; petioles 1.5 to 3 cm long; stipules oblong-ovate, acuminate, laciniate, about 6 mm long. Cymes axillary, solitary, long-peduncled, 8 to 12 cm long, the peduncular parts 6 to 8 cm in length; primary branches few, verticillately arranged, about 2 cm long, the capsules somewhat crowded at the ends of the branches, their pedicels 2 to 3 mm long; bracts oblong, subacute, about 6 mm long. Capsules obovoid, about 3 mm long, the persistent calyx-teeth ovate, subacute, about 3 mm in length.

CATANDUANES, in forests along the Santo Domingo River, *Bur. Sci.* 30551 Ramos, December 3, 1917.

This species is well characterized by its acutely angled branches and branchlets, its relatively large leaves, and its long-peduncled axillary inflorescences. It somewhat resembles *Hedyotis fruticulosa* Volken, of the Caroline Islands and, among the Philippine species, is probably closest to *Hedyotis phanerophlebia* Merr.; from both of these it differs radically in its vegetative and inflorescent characters.

HEDYOTIS OLIGANTHA sp. nov.

Herba parva, prostrata vel adscendens, parce ramosa, 10 ad 15 cm longa, subglabra, ramis tenuibus, 4-angulatis, glabris; foliis oblongo-lanceolatis ad anguste lanceolatis, oppositis, glabris vel minutissime scaberulis, usque ad 1.5 cm longis et 3 mm latis, sessilibus, basi angustatis, cum stipulis adnatis, acutis vel acuminatis, subtus pallidioribus, nervis lateralibus obsoletis; stipulis cupulatis, truncatis, leviter pubescentibus, margine tenuiter laciniatis, laciniis 3 vel 4, tenuibus, scaberulis, 2 ad 4 mm longis; floribus solitariis, sessilibus, axillaribus, corollae tubo gracile, 4 mm longo, lobis oblongis, valde reflexis, 3 mm longis, intus ad basi villosissimis.

A small, prostrate or ascending, slender, sparingly branched, nearly glabrous perennial herb, the stems 10 to 15 cm long,

slender, glabrous, 4-angled. Leaves opposite, glabrous or very minutely scaberulous, oblong-lanceolate to narrowly lanceolate, rather stiff, 1 to 1.5 cm long, 1.5 to 3 mm wide, the lower surface pale, the midrib distinct but the nerves and reticulations obsolete, the base narrowed and connate with the stipules, apex somewhat acuminate; stipules cupular, truncate, their margins with usually 3 or 4, slender, scabrid, 2 to 4 mm long teeth. Flowers axillary, sessile, solitary, white. Corolla-tube very slender, 4 mm long, the lobes oblong, 2.5 to 3 mm long, strongly recurved, densely villous inside near the base. Capsule oblong-obovate, somewhat angled, 3 mm long, the persistent calyx-lobes lanceolate, acuminate, 1.5 to 2 mm long.

LUZON, Rizal Province, Mount Susong Dalaga, *Bur. Sci.* 29425 Ramos & Edaña (type), August 2, 1917: Bataan Province, Limay, *Bur. Sci.* 6180 Robinson, August, 1908: Pampanga Province, Mount Arayat, *Merrill* 4220, September, 1905, on damp shaded banks in forests, altitude 300 to 900 meters.

This species belongs in the group with *Hedyotis tenelliflora* Blume, *H. nitida* W. & A., and *H. pinifolia* Wall., and is perhaps most closely allied to the second one, although very different from it in details. The very slender, elongated corolla-tube and the solitary flowers are characteristic.

HEDYOTIS SCABERRIMA sp. nov.

Frutex parvus, foliis utrinque valde scaberrimis, ramis primariis usque ad 60 cm longis; foliis membranaceis, fragilis, oblongo-ovatis, 8 ad 11 cm longis, apice acuminatis, nervis utrinque circiter 7, supra impressis, subtus prominulis, subtus ad costa villosis; petiolo villosi; stipulis 4 ad 5 mm longis, 7-lacinia-tis, laciniae 2.5 ad 3 mm longae; floribus numerosis, axillaribus, fasciculatis, confertis, corollae circiter 3 mm longae.

Apparently an undershrub, the branches at least 60 cm long, the leaves very rough on both surfaces with short rigid projections, branches somewhat 4-angled or distinctly sulcate, more or less villous with spreading hairs. Leaves membranaceous, brittle when dry, greenish olivaceous, oblong-ovate, 8 to 11 cm long, 3 to 4.5 cm wide, base rounded to acute or somewhat decurrent-acuminate, somewhat narrowed upward to the rather prominently acuminate apex, both surfaces hispid-scaberulous, the midrib beneath and the petiole densely villous with spreading white hairs; lateral nerves about 7 on each side of the midrib, slender, curved, ascending, projecting on the lower surface, impressed on the upper surface, the primary reticulations very

lax, rather distinct on the upper surface, obscure beneath; petioles 5 to 8 mm long; stipules 4 to 5 mm long, divided into 7 linear laciniae, the upper 4 about 3 mm long, the lower ones somewhat shorter. Flowers in dense axillary fascicles about 1 cm in diameter, their pedicels 1 to 1.5 mm long. Calyx about 2 mm in diameter, the lobes 4, oblong, about 1 mm long. Corolla white, 3 mm long, glabrous, the lobes 4, oblong, reflexed, about 1.2 mm long. Capsule elliptic-obovoid, glabrous, about 2 mm long.

PANAY, Capiz Province, Jamindan, *Bur. Sci.* 30940 Ramos & Edaña, May 27, 1918, in thickets along streams.

This species belongs in the group with *Hedyotis philippensis* (Willd.) Merr. and is closely allied to *H. asperrima* Merr. from which it is distinguished by its somewhat larger leaves, the midrib beneath and the petioles being rather densely white-villous, as well as by its different stipules. In *Hedyotis asperrima* the midrib beneath and the petioles are more or less scabrid, not villous, while the laciniae of the stipules are reduced to short lateral projections 1 mm long or less. Another differential character is that of the midrib and nerves which are not at all impressed in *Hedyotis asperrima* but which are conspicuously so in *H. scaberrima*.

HEDYOTIS SIMPLEX sp. nov.

Species *H. rigidae* affinis. Suffrutex erectus, simplex, 40 ad 60 cm altus, caulibus vetustioribus teretibus glabris, junioribus sulcatis vel obscure angulatis, parcissime hirsutis; foliis chartaceis, lanceolatis ad oblongo-lanceolatis, usque ad 14 cm longis, glabris, nitidis, utrinque acuminatis vel basi acutis, nervis utrinque circiter 7, adscendentibus, distinctis; stipulis ovatis ad oblongo-ovatis, circiter 12 mm longis, acuminatis, margine leviter laceratis; inflorescentiis axillaribus, dense multifloris, subglobosis vel hemisphaericis, sub fructu 1 ad 1.5 cm diametro; fructibus globosis vel leviter obovoideis, circiter 2 mm diametro, parcissime hirsutis, calycis lobis oblongo-ovatis, obtusis, circiter 1.5 mm longis, leviter hirsutis.

An erect, unbranched undershrub, 40 to 60 cm high, the older stems terete, glabrous, up to 5 mm in diameter, the younger parts somewhat hirsute, sulcate or somewhat angled. Leaves chartaceous, lanceolate to oblong-lanceolate, somewhat olivaceous when dry, glabrous, shining, 9 to 14 cm long, 2 to 3.5 cm wide, subequally narrowed to the acute or acuminate base and to the rather slenderly acuminate apex; lateral nerves 7 on each side

of the midrib, slender but distinct, ascending, obscurely anastomosing, the reticulations obscure; petioles 2 to 2.5 cm long; stipules ovate to oblong-ovate, prominently acuminate, thin, glabrous or sparingly hirsute, about 12 mm long, the margins somewhat lacerate. Inflorescences axillary, dense, many-flowered, in fruit forming globose or hemispheric masses 1 to 1.5 cm in diameter. Pedicels 1.5 to 2 mm long. Bracteoles linear-oblong, up to 4 mm in length, sparingly ciliate-hirsute. Capsules globose to somewhat obovoid, 2 mm long, sparingly hirsute, the persistent calyx-lobes oblong-ovate, obtuse, 1.5 mm long, somewhat hirsute.

CATANDUANES, in forests, *Bur. Sci.* 30389 (type), 30242 Ramos, November, 1917. BILIRAN, Mount Suir, *Bur. Sci.* 18914, 18745 McGregor, June, 1914.

This species resembles *Hedyotis rigida* Miq. (*H. leucocarpa* Elm.), but is entirely different in habit, being an unbranched undershrub, with larger stipules and very numerous, sparingly hirsute, smaller fruits which are crowded in dense hemispheric to globose infructescences.

IXORA Linnaeus

IXORA LUZONIENSIS sp. nov.

Frutex 1 ad 2 m altus, glaber, ramis ramulisque teretibus vel ramulis leviter compressis; foliis lanceolatis ad oblongo-lanceolatis, chartaceis, usque ad 16 cm longis, in siccitate pallidis, nitidis, breviter petiolatis, apice acuminatis, basi angustatis, acutis; nervis lateralibus utrinque circiter 15, tenuibus, distinctis, arcuato-anastomosantibus; stipulis filiformibus, 7 ad 10 mm longis; infructescentiis terminalibus, circiter 3 cm longis, e basi ramosis; floribus ut videtur paucis; fructibus ovoideis, 6 ad 8 mm diametro.

A glabrous shrub 1 to 2 m high, the branches and branchlets terete or the latter slightly compressed, slender. Leaves lanceolate to oblong-lanceolate, chartaceous, pale and shining when dry, 11 to 16 cm long, 1.5 to 3 cm wide, narrowed upward to the acuminate apex and below to the acute base; primary lateral nerves about 15 on each side of the midrib, slender, distinct, spreading, arched-anastomosing; petioles about 2 mm long; stipules filiform, 7 to 10 mm long from a somewhat widened base. Infructescences terminal, about 3 cm long, branched from the base, the flowers apparently few, the pedicels 5 to 8 mm long, the branches few, spreading, the bracts linear-lanceolate, about 1 mm long. Fruits red, ovoid, 6 to 8 mm in diameter, brown to nearly black when dry.

LUZON, Cagayan Province, Pamplona, *Bur. Sci.* 7420, 7481 p. p. Ramos, March, 1909: Zambales Province, *Bur. Sci.* 5045 Ramos, December, 1907: Pangasinan Province, Mount San Isidro, Labrador, *Bur. Sci.* 29956 *Fénix* (type), November 4, 1917, in forests, altitude 350 to 400 meters.

The alliance of this species is undoubtedly with *Ixora sparsiflora* Elm., from which it is at once distinguished by its much narrower, entirely differently shaped leaves which are acute, not broad and cordate at the base. From *Ixora longistipula* Merr. it is at once distinguished by its entirely different inflorescences.

MORINDA Linnaeus

MORINDA CORIACEA sp. nov.

Frutex scandens, glaber, ramulis circiter 2 mm diametro, foliis crasse coriaceis, oblongis, 7 ad 11 cm longis, utrinque subaequaliter angustatis, basi acutis, apice obtuse acuminatis, nervis utrinque circiter 8, tenuibus, distinctis; fructibus solitariis vel paucis, globosis, circiter 12 mm diametro.

A woody, glabrous vine, the branches dark-colored when dry, the ultimate branchlets subterete, 2 mm in diameter or less. Leaves rather thickly coriaceous, oblong, 7 to 11 cm long, 1.8 to 3.5 cm wide, usually olivaceous and slightly shining when dry, subequally narrowed to the acute base and to the usually blunt-acuminate apex; lateral nerves about 8 on each side of the midrib, slender, rather distinct as are the primary reticulations; petioles 5 to 7 mm long; stipules somewhat sheathing, deciduous, about 4 mm long. Fruits terminal, solitary, in pairs or sometimes threes, umbellately arranged, globose, rather many-seeded, about 12 mm in diameter, yellow when fresh, black or brown when dry, their pedicels usually about 1 cm in length.

MINDANAO, Surigao Province, *Bur. Sci.* 34439 Ramos & Pascasio, April 25, 1919, along small streams at low altitudes.

A species belonging in the group with *Morinda umbellata* Linn., but distinguished from all forms of this species known to me by its vegetative characters.

MORINDA NITIDA sp. nov.

Frutex scandens, glaber, ramulis 3 ad 5 mm diametro; foliis coriaceis, ellipticis, supra nitidissimis, 7 ad 11 cm longis, basi acutis, apice breviter obtuse acuminatis, nervis utrinque circiter 10, tenuibus; fructibus junioribus carnosus, globosis, circiter 2 cm diametro, laevis.

A glabrous, woody vine, the branchlets 3 to 5 mm in diameter, smooth, nearly black when dry. Leaves coriaceous, elliptic, the

upper surface dark olivaceous to nearly black when dry, very conspicuously shining, the lower surface slightly shining and very dark brown, 7 to 11 cm long, 4.5 to 5.5 cm wide, the base acute or somewhat decurrent, the apex very shortly and obtusely acuminate; lateral nerves about 10 on each side of the midrib, slender, anastomosing, the primary reticulations lax; petioles 2 to 2.5 cm long; stipules ovate to ovate-lanceolate, acuminate, about 8 mm long. Fruits umbellately arranged at the tips of the branchlets, usually about 4 to each branchlet, globose, fleshy, about 2 cm in diameter, black when dry, their pedicels 2 to 2.5 cm long, the pericarp nearly smooth, the seeds apparently few.

BUCAS GRANDE, *Bur. Sci.* 35074 Ramos & Pascasio, June 11, 1919, in dry forests.

A species in some respects suggestive of *Morinda*^r *vulubilis* Merr., but with entirely different infructescences. It is strongly characterized by its very shiny leaves, the upper surfaces of which appear as if they were varnished.

MUSSAENDA Linnaeus

MUSSAENDA ACUMINATISSIMA sp. nov.

Frutex erectus, perspicue villosis; foliis in paribus subaequalibus, chartaceis, ovatis, usque ad 16 cm longis, basi decurrento-acuminatis, apice tenuiter subcaudato-acuminatis utrinque plus minusve villosis, nervis utrinque 10 ad 12 subtus perspicuis; cymis pedunculatis, circiter 8 cm diametro, bracteis lineari-lanceolatis, acuminatis, circiter 7 mm longis; floribus 3.5 ad 4 cm longis, sepalis lineari-lanceolatis, acuminatis, persistentibus, 1 ad 1.5 cm longis, sepala foliacea longe stipitata, limbo ovato ad elliptico-ovato, 4 ad 6 cm longo.

An erect shrub, 3 m high (*fide* Ramos), most parts prominently villous. Branches dark reddish-brown, lenticellate, glabrous, the branchlets densely ferruginous-villous. Leaves of each pair subequal, ovate, chartaceous, olivaceous when dry, 9 to 16 cm long, 5 to 8.5 cm wide, base rather abruptly contracted and long decurrent-acuminate, apex slenderly subcaudate-acuminate, the upper surface villous with scattered hairs, the lower surface densely villous with longer hairs on the midrib and nerves, the hairs on the reticulations more scattered; lateral nerves 10 to 12 on each side of the midrib, prominent on the lower surface; petioles 1.5 to 2 cm long, villous; stipules oblong, acute or acuminate, about 1.5 cm long. Cymes rather many-flowered, about 8 cm wide, villous, the indumentum castaneous to ferruginous, dense on the younger parts, the peduncles about 2.5 cm long;

bracts linear-lanceolate, acuminate, about 7 mm long. Flowers yellow, 3.5 to 4 cm long. Calyx-tube very densely villous, the lobes linear-lanceolate, persistent, villous, acuminate, 1 to 1.5 cm long, less than 2 mm wide. Corolla ferruginous-villous, somewhat expanded upward, the lobes ovate, somewhat acuminate, 5 to 6 mm long; foliaceous sepals long-stipitate, membranaceous, white, somewhat pubescent, the limb ovate to elliptic-ovate, 4 to 6 cm long, acuminate, the nerves and reticulations distinct. Fruit (immature) somewhat obovoid, sparingly pubescent, 1.5 cm long.

LUZON, Ilocos Norte Province, Mount Nagapatan, *Bur. Sci.* 33133 Ramos, August 8, 1918, on dry slopes, altitude about 700 meters.

Among those species with slender, elongated, persistent sepals this species is apparently most closely allied to *Mussaenda philippinensis* Merr., but differs radically from that in its indumentum and in its differently shaped, smaller, more-numerously nerved leaves.

OPHIORRHIZA Linnaeus

OPHIORRHIZA MACGREGORII sp. nov.

Herba erecta, simplex vel parce ramosa, 5 ad 10 cm alta, ramis et foliis subtus et inflorescentiis dense puberulis; foliis ovatis ad ovato-ellipticis, usque ad 6 cm longis, membranaceis ad chartaceis, obtusis vel acutis, basi obtusis ad rotundatis, nervis utrinque 6 vel 7, tenuibus, distinctis; cymis breviter pedunculatis, densis, paucifloris, circiter 1 cm diametro; floribus circiter 5 mm longis, calycibus puberulis, corolla glabra; capsulis circiter 7.5 mm latis, truncatis vel subtruncatis, obscure puberulis.

An erect, simple or sparingly branched herb, 5 to 10 cm high, the stems, branches, and petioles rather densely subferruginous-puberulent, the indumentum usually pale on the midrib and nerves. Leaves ovate to ovate-elliptic, 2.5 to 6 cm long, 1.5 to 3 cm wide, membranaceous to chartaceous, obtuse or acute, base rounded to obtuse, entire, the upper surface cinereous to olivaceous, very minutely and obscurely subpapillate-puberulent, the lower surface pale, densely puberulent on the midrib and lateral nerves; nerves 6 or 7 on each side of the midrib, slender, distinct; petioles about 5 mm long. Cymes about 1 cm in diameter or less, rather dense, puberulent, rather few-flowered, their peduncles less than 1 cm long. Flowers white, about 5 mm long. Calyx subglobose, 1.3 mm long, the teeth 5, oblong, 0.2 mm long. Corolla-tube glabrous, 3 mm long, the lobes oblong, obtuse, 1 mm long. Capsule compressed, 7 to 8 mm wide, about 3 mm

long, somewhat puberulent, the lobes spreading, rounded or obtuse, the apex of the capsule truncate or nearly so.

LUZON, Laguna Province, Paete, *Bur. Sci.* 22944, 23024 (type) *McGregor*, June, 1915, in forests, altitude 100 to 200 meters.

This species is perhaps as closely allied to *Ophiorrhiza ovata* Merr. as any other species, but has differently shaped, somewhat larger leaves, dense inflorescences, and larger capsules which are truncate at their apices.

OPHIORRHIZA OVATA sp. nov.

Herba erecta, simplex vel parce ramosa, usque ad 14 cm alta; foliis in paribus plus minusve inaequalibus, subtus ad costa nervisque parce puberulis, ovatis ad oblongo-ovatis, membranaceis, usque ad 5 cm longis, supra olivaceis, nitidis, subtus pallidis, apice acutis vel acuminatis, basi decurrento-acuminatis, nervis utrinque circiter 6, tenuibus; inflorescentiis laxis, tenuiter pedunculatis, usque ad 2.5 cm diametro, paucifloris; floribus glabris, corollae tubo circiter 2.5 mm longo.

An erect, simple or sparingly branched, nearly glabrous herb, up to 14 cm in height. Stems slender, somewhat pubescent. Leaves of each pair somewhat unequal in size, ovate to oblong-ovate, membranaceous, entire, 2 to 5 cm long, 1.5 to 2.3 cm wide, the upper surface olivaceous, shining, glabrous or with very few, widely scattered, short hairs, the lower surface pale, distinctly puberulent on the midrib and lateral nerves, the apex acute to acuminate, base decurrent-acuminate; lateral nerves about 6 on each side of the midrib, slender, distinct, anastomosing; petioles slender, 5 to 10 mm long, pubescent. Cymes lax, glabrous, few-flowered, their peduncles slender, about 1 cm long, the pedicels up to 4 mm in length. Flowers white, glabrous. Calyx ovoid, 1.2 to 1.5 mm long, the teeth 5, oblong, obtuse, 0.3 mm long. Corolla-tube cylindric, glabrous, 2.5 mm long, the lobes ovate, about 1 mm long. Capsule compressed, about 5 mm wide, the lobes divaricately spreading.

LUZON, Laguna Province, Siniloan-Infanta trail, near Fami, *Bur. Sci.* 23163 *McGregor*, July 20, 1915, on damp rocky stream banks.

This species is well characterized by its low stature, its usually ovate leaves, and its slender, peduncled, lax, glabrous inflorescences.

OPHIORRHIZA PUBIFLORA sp. nov.

Herba erecta, simplex vel parce ramosa, 5 ad 12 cm alta, perspicue pubescens vel puberula; foliis in paribus distincte

inaequalibus, oblongis ad oblongo-ovatis, usque ad 8 cm longis, in siccitate saepe nigrescentibus, acutis, basi obtusis ad subacutis, nervis utrinque 10 ad 14, distinctis; stipulis bifidis, lobis filiformibus, pubescentibus, 4 ad 6 mm longis; cymis pedunculatis, sub anthesis circiter 1.5 cm diametro, perspicue pubescentibus; floribus circiter 6.5 mm longis, corollae tubo dense pubescente; capsulis compressis, subflabelliformibus, circiter 4 mm longis et 7 mm latis, pubescentibus, apice rotundatis vel subtruncatis.

An erect, simple or sparingly branched herb, 5 to 12 cm high, most parts distinctly pubescent or puberulent, the stems mostly 3 to 6 cm long, somewhat woody below. Leaves of each pair distinctly unequal in size, in general oblong to oblong-ovate, 3 to 8 cm long, 1.5 to 3.5 cm wide, often black when dry, apex acute, base acute to rounded or obtuse, both surfaces more or less pubescent or puberulent, especially on the midrib and nerves; lateral nerves 10 to 14 on each side of the midrib, distinct, curved, anastomosing; stipules cleft into two filiform, pubescent, 4 to 6 mm long lobes; petioles 5 to 12 mm long, pubescent. Cymes peduncled, rather dense, about 1.5 cm in diameter in anthesis, all parts including the corolla densely pubescent. Flowers white, about 6.5 mm long, the pedicels short. Calyx ovoid, pubescent, 2 mm long, the teeth 5, 0.5 mm long. Corolla-tube densely pubescent, 3.5 mm long, the lobes oblong, obtuse, about 2 mm long. Capsules pubescent, compressed, about 7 mm wide and 4 mm long, subflabelliform, apex rounded to subtruncate, not lobed.

LUZON, Rizal Province, Mount Susong Dalaga, *Bur. Sci.* 29353 (type), 29355 Ramos & Edaña, in forests near the summit, altitude at least 1,000 meters.

This species somewhat resembles *Ophiorrhiza macgregorii* Merr., but is not closely allied to it. It is strongly characterized by its pubescent flowers and its pubescent, somewhat fan-shaped capsules which are compressed but not at all lobed, and rounded or truncate at their apices.

OPHIORRHIZA STENOPHYLLA sp. nov.

Herba erecta, simplex, 7 ad 13 cm alta, caulibus dense cinereo-vel griseo-pubescentibus; foliis lanceolatis ad anguste lanceolatis, chartaceis, in paribus distincte inaequalibus, supra olivaceis, glabris vel subglabris, subtus pallidioribus, ad costa nervisque minutissime puberulis, 3 ad 7 cm longis, 0.5 ad 1.3 cm latis, utrinque angustatis, acuminatis, nervis utrinque circiter 10, tenuibus; inflorescentiis cymosis, paucifloris, tenuiter pedunculatis; floribus circiter 5 mm longis, corollae tubo glabro.

An erect, simple, slender herb, 7 to 13 cm high, the leaf-bearing part of the stem 3 to 5 cm in length, terete, densely cinereous- or griseous-pubescent. Leaves opposite, those of each pair distinctly unequal, lanceolate to narrowly lanceolate, 3 to 7 cm long, 5 to 13 mm wide, chartaceous, entire, subequally narrowed to the somewhat acuminate or merely acute base and apex, the upper surface olivaceous, slightly shining, glabrous, or with very few, widely scattered, very short hairs, the lower surface paler, densely and minutely puberulent on the midrib and nerves; lateral nerves about 10 on each side of the midrib, slender; petioles 2 to 5 mm long; stipules triangular-ovate, about 2 mm long, acute. Cymes few-flowered, 1 to 1.5 cm in diameter, their slender peduncles densely pubescent, 1.5 to 3 cm long, the branches and pedicels pubescent, ebracteate. Flowers about 5 mm long. Calyx slightly urceolate, externally minutely pubescent, about 1.8 mm long, the teeth 5, oblong-ovate, acute, 0.3 mm long. Corolla-tube cylindric, 3 mm long, glabrous, the lobes oblong, obtuse, 1.5 mm long. Fruits compressed, 2 mm long, 5 mm wide, glabrous, crowned with the 5 minute calyx-teeth.

LUZON, Cavite Province, Alfonso, *Bur. Sci.* 22591 Ramos & Deroy, May 11, 1915, on rocks along small streams, altitude about 600 meters.

This species is well characterized by its narrow, entire leaves, its densely pubescent simple stems, and its slenderly peduncled inflorescences.

OPHIORRHIZA TENUIS sp. nov.

Herba tenuis, prostrata vel adscendens, plus minusve pubescentibus, simplex vel distanter ramosis, usque ad 20 cm longis; foliis parvis, aequalibus, membranaceis, ellipticis ad oblongo-ellipticis, circiter 1 cm longis, utrinque acutis vel subobtusis, nervis utrinque circiter 4; cymis tenuiter pedunculatis paucifloris, haud 1 cm diametro; floribus circiter 3 mm longis, glabris; capsulis compressis, circiter 5 mm latis et 2.5 mm longis, apice subtruncatis, glabris, obscure bilobatis, lobis rotundatis.

A slender, prostrate or ascending, simple or distantly branched herb, copiously rooting at the lower nodes, up to 20 cm in length, the stems distinctly pubescent. Leaves in equal pairs, small, membranaceous, elliptic to oblong-elliptic, 8 to 13 mm long, 5 to 8 mm wide, the upper surface olivaceous, glabrous, shining, the lower pale, puberulent on the midrib and nerves, subequally narrowed to the acute to somewhat obtuse base and apex; lateral nerves about 4 on each side of the midrib, slender, distinct;

petioles pubescent, 2 to 3 mm long; stipules linear, entire, about 1 mm long. Cymes rather dense, few-flowered, slenderly peduncled, less than 1 cm in diameter, their peduncles pubescent, about 1.5 cm long. Flowers (young) about 3 mm long. Calyx globose, about 1 mm long, glabrous, the teeth oblong, 0.5 mm long, the pedicels 1 mm long or less. Capsules glabrous, compressed, about 5 mm wide and 2 to 2.5 mm long, apex nearly truncate, crowned with the 5 distinct calyx-teeth, the lateral lobes spreading, rounded.

LUZON, Rizal Province, Mount Lumutan, *Bur. Sci.* 29785 Ramos & Edaño, August 17, 1917, in forests near the summit, altitude apparently about 1,000 meters.

This species is strongly characterized by its slender, elongated, prostrate stems which root at the nodes and its small leaves. It is not at all closely allied to any previously described Philippine species.

PLECTRONIA Linnaeus

PLECTRONIA BRUNNEA sp. nov.

Frutex erectus, subglaber, novellis minutissime puberulis; foliis in siccitate brunneis, oblongis, subcoriaceis, usque ad 19 cm longis, junioribus subtus parcissime castaneo-puberulis, perspicue acuminatis, basi leviter decurrento-acuminatis, nervis utrinque 7 ad 9, perspicuis, evanescentibus, reticulis obsoletis; fructibus axillaribus, solitariis vel binis, oblongo-obovoideis, compressis, in siccitate nigris, nitidis, rugosis, obtusis, basi attenuatis, circiter 1.5 cm longis.

An erect, subglabrous shrub, the very young parts and the lower surfaces of young leaves sparingly castaneous-puberulent, soon becoming glabrous. Branches terete, dark-brown or reddish-brown, the young branchlets more or less compressed and sulcate. Leaves uniformly dark-brown above and paler brown beneath when dry, oblong, subcoriaceous, 14 to 19 cm long, 5 to 7 cm wide, shining, the apex conspicuously acuminate, acumen slender, elongated, acute or subacute, sometimes falcate, base broad, somewhat decurrent-acuminate; lateral nerves 7 to 9 on each side of the midrib, prominent, curved, evanescent, the reticulations obsolete; petioles about 8 mm long; stipules lanceolate-acuminate from a somewhat ovate base, about 1 cm long. Fruits axillary, solitary or in pairs on a very short peduncle, subtended by a pair of ovate, caudate-acuminate bracts about 5 mm in length, the peduncle and pedicels about 3 mm long, the

fruits, when dry, oblong-ovoid, rugose, compressed, shining, obtuse, base acute, about 1.5 cm long and 1 cm wide.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28791 (type), 28612 Ramos & Edaño, May, 1917, in the mossy forest, apparently at an altitude of about 1,000 meters.

This species is well characterized by its rather large, oblong, brown leaves, the nerves being prominent but evanescent before reaching the margins and the reticulations being obsolete; and its axillary or solitary, compressed, oblong-ovate fruits which are about 1.5 cm long, compressed and rugose when dry.

PLECTRONIA OLIGOPHLEBIA sp. nov.

Frutex glaber; foliis crassissime coriaceis, oblongis, usque ad 5 cm longis, in siccitate brunneis vel atro-brunneis, brevissime petiolatis, utrinque acutis, subtus in axillis haud glandulosis, nervis utrinque 2 vel 3, subtus prominulis, adscendentibus, distinctis, reticulis obsoletis; inflorescentiis axillaribus, solitariis, umbellatis, umbellis 7- ad 12-floris, brevissime pedunculatis vel superioribus sessilibus; floribus parvis, circiter 4.5 mm diametro.

A glabrous shrub, 4 mm high (*fide* Ramos), the branches somewhat thickened, the branchlets somewhat 4-angled, the internodes 1 cm long or less. Leaves oblong, very thickly coriaceous, brown or blackish-brown when dry, slightly shining, smooth, 3.5 to 5 cm long, 1.2 to 1.6 cm wide, subequally narrowed to the acute base and apex; lateral nerves 2 or 3 on each side of the midrib, ascending, distinct, slightly raised on the lower surface; stipules broad, 1.5 to 2 mm long; petioles 1 mm long or less. Umbels axillary, solitary, 7- to 12-flowered, the peduncles 2 mm long or less, the upper inflorescences often sessile; pedicels 4 to 5 mm long. Flowers green, about 4.5 mm in diameter, the calyx about 2 mm in diameter, shortly 4-toothed. Corolla-tube about 1 mm long, the lobes broadly ovate, acute, spreading, about 2 mm long.

LUZON, Rizal Province, Mount Susong Dálaga, *Bur. Sci.* 29342 Ramos & Edaño, August 7, 1917, in the mossy forest at the summit, apparently at or above an altitude of 900 meters.

The alliance of this species is manifestly with *Plectronia gynochthodes* Baill. (*P. umbellata* K. Schum.), from which it is distinguished by its smaller, fewer-nerved leaves and its very shortly peduncled to sessile umbels. It is less closely allied to *Plectronia ramosii* Merr., the latter species differing in its longer petioles, peduncles, and pedicels, and in numerous other characters.

PLECTRONIA RAMOSII sp. nov.

Species *P. gynochthodes* Baill. affinis, differt foliis minoribus, umbellulis 2- ad 4-floris. Arbor parva, glabra, ramis tenuibus, brunneis; foliis subcoriaceis, oblongis, utrinque subaequaliter attenuatis et acuminatis, usque ad 5 cm longis, in siccitate supra castaneis vel olivaceo-brunneis, nitidis, subtus in axillis barbato-glandulosis, nervis utrinque 3 vel 4, tenuibus, reticulis obsoletis; umbellulis axillaribus, solitariis, pedunculatis, 2- ad 4-floris; fructibus obovoideis, brunneis, nitidis, in siccitate rugosis, circiter 1 cm longis.

A small, glabrous tree, about 8 m high, the branches and branchlets terete, the former pale-brownish or grayish, the latter slender, reddish-brown. Leaves in general oblong, equally attenuate and acuminate at both ends, 4 to 5 cm long, 1 to 2 cm wide, subcoriaceous, the upper surface castaneous to olivaceous brown when dry, smooth, shining, the lower surface paler, glandular and bearded in the axils; lateral nerves slender, not prominent, 3 or 4 on each side of the midrib, the reticulations obsolete; petioles 1 cm long or less. Umbels axillary, solitary, 2- to 4-flowered, their peduncles slender, about 8 mm long, the pedicels about as long as the peduncles. Fruits brown, shining, and somewhat rugose when dry, obovoid, about 1 cm long, 2- or 1-seeded.

LUZON, Tayabas Province, Umiray, *Bur. Sci.* 28973 Ramos & Edaña, June 1, 1917, in forests along the Umiray River at low altitudes.

The alliance of this species is manifestly with *Plectronia gynochthodes* Baill. [*P. umbellata* (Bartl.) K. Schum.], from which it is distinguished by its smaller, fewer-nerved leaves and few-flowered umbels.

PLECTRONIA SUBCAPITATA sp. nov.

Arbor glabra, circiter 8 m alta, ramis teretibus, ramulis compressis, sulcatis, brunneis, internodiis elongatis; foliis oblongis ad oblongo-lanceolatis, chartaceis ad subcoriaceis, usque ad 25 cm longis, in siccitate brunneis, nitidis, sursum attenuatis et perspicue acuminatis, basi acutis ad decurrento-acuminatis, nervis primariis utrinque circiter 5, curvato-adscendentibus, perspicuis, reticulis obsoletis; inflorescentiis axillaribus, solitariis, pedunculatis, subcapitatis, bracteis binis abrupte longecuspidatis subtensis, pedunculis patulis vel recurvatis, 1 ad 1.5 cm longis; floribus numerosis, umbellatim dispositis, 4-meris, circiter 6 mm longis.

A glabrous tree, about 8 m high, the branches and branchlets smooth, brown, the latter compressed and sulcate, the internodes up to 8 cm in length. Leaves oblong to oblong-lanceolate, brown and shining when dry, chartaceous to subcoriaceous, 15 to 25 cm long, 4.5 to 6 cm wide, narrowed upward to the prominently long-acuminate apex, the base acute to somewhat decurrent-acuminate; lateral nerves about 5 on each side of the midrib, prominent, curved-ascending, evanescent, the reticulations obsolete; petioles 1.5 to 2 cm long; stipules broadly triangular, acuminate, about 5 mm long. Inflorescences axillary, solitary, peduncled, the peduncles 1 to 1.5 cm long, spreading or recurved, bearing at their tips a pair of prominent bracts, the basal portions of the bracts broadly ovate, about 5 mm in diameter, abruptly cuspidate-acuminate, the projecting tip about 5 mm long. Flowers subtended by the bracts, umbellately arranged, up to 25 in each inflorescence, greenish-white, their pedicels about 6 mm long. Buds cylindric, 6 mm long. Calyx-teeth lanceolate, acuminate, 1.3 mm long. Corolla-tube 4 mm long, bearded within, the lobes 4, oblong-lanceolate, acute or slightly acuminate, about 2 mm long. Stigma capitate. Anthers 1.4 mm long, ellipsoid.

LUZON, Apayao Subprovince, Ngagan, *Bur. Sci.* 28117 *Fénix*, May 10, 1917, on forested slopes, locally known as *apaypay*.

A species well characterized by its axillary, solitary, conspicuously bracteate, peduncled, subcapitate inflorescences.

PSYCHOTRIA Linnaeus

PSYCHOTRIA AMPLISSIMA sp. nov.

Frutex circiter 1 m altus, glaber; foliis magnis, usque ad 30 cm longis et 14 cm latis, ellipticis ad late oblongo-obovatis, subcoriaceis, nitidis, apice obtusis ad rotundatis, basi angustatis, cuneatis, nervis utrinque circiter 24, subtus valde prominentibus; stipulis lanceolatis, acuminatis, subcoriaceis, 3 ad 3.5 cm longis; cymis terminalibus, e basi ramosis, floribus circiter 5 mm longis, in ramis ultimis plus minusve confertis.

A shrub, about 1 m high, quite glabrous, the branches apparently terete. Leaves elliptic to broadly oblong-obovate, about 30 cm long and 14 cm wide, somewhat pale and shining when dry, subcoriaceous, the apex obtuse to broadly rounded, base narrowed, cuneate or decurrent-acuminate; lateral nerves about 24 on each side of the midrib, very prominent on the lower surface, spreading-curved, anastomosing close to the margin, the primary reticulations rather lax, distinct; petioles 5 to 7 cm long; stipules subcoriaceous, lanceolate, acuminate, brownish

when dry, 3 to 3.5 cm long. Inflorescence a terminal cyme about 11 cm long, with two primary branches from the base, the main rachis and primary branches again branched at or above the upper one-third, the flowers rather crowded on the ultimate branchlets, their pedicels up to 5 mm in length. Calyx rather shallow, acutely toothed. Corolla, in bud, about 4.5 mm long, the throat villous inside.

LEYTE, Dagami, *Bur. Sci.* 15198 Ramos, August 9, 1912, along streams in forests.

Among all the Philippine species *Psychotria amplissima* is readily distinguished by its very large, obtuse or rounded, prominently nerved, long-petioled leaves and its long stipules.

PSYCHOTRIA CAPIZENSIS sp. nov.

Frutex erectus, ramulis et inflorescentiis et subtus foliis ad costa nervisque plus minusve castaneo-pubescent; foliis subcoriaceis, oblongo-ellipticis, 8 ad 12 cm longis, utrinque subaequaliter angustatis, basi acutis, apice leviter acuminatis, nervis utrinque circiter 20, subtus valde perspicuis; infructescentiis circiter 2 cm longis, fructibus paucis, obovoideis, 5 mm longis, haud sulcatis, albumine aequabile.

An erect shrub, the branchlets, petioles, midrib, and nerves on the lower surface, and the inflorescences more or less castaneous-pubescent, branches terete, glabrous. Leaves subcoriaceous, oblong-elliptic, brownish when dry, 8 to 12 cm long, 3 to 5 cm wide, subequally narrowed to the acute base and slightly acuminate apex, the short acumen usually blunt; lateral nerves about 20 on each side of the midrib, very prominent on the lower surface, parallel, slightly curved, arched-anastomosing near the margin, the reticulations rather close, distinct; petioles 1 to 2 cm long, in age glabrous; stipules deciduous. Infructescences terminal, simple, about 2 cm long, densely pubescent. Fruits few, obovoid, yellow when fresh, black when dry, glabrous, about 5 mm long, not at all sulcate, base acute and apex broadly rounded; seeds plano-convex, the albumen not at all ruminant.

PANAY, Capiz Province, Mount Madias, *Bur. Sci.* 30657 Ramos & Edaña, May 13, 1918, in forests, altitude not indicated.

This species somewhat resembles the ones associated with *Psychotria bataanensis* Elm., most of which belong in the section *Grumilea*. Among these it most closely resembles *Psychotria rizalensis* Merr., from which it differs not only in its longer pedicels and non-sulcate fruits, but also in its albumen not being at all ruminant.

PSYCHOTRIA CASTANEA sp. nov. § *Grumilea*.

Frutex erectus, glaber, ramulis tenuibus, brunneis vel rubro-brunneis; foliis anguste lanceolatis, chartaceis, usque ad 10 cm longis, in siccitate utrinque castaneis, utrinque subaequaliter angustatis et acuminatis, nervis utrinque circiter 13, tenuibus, reticulis obscuris vel subobsoletis; fructibus fasciculatis, sessilibus vel breviter pedicellatis, castaneis, ellipsoideis, laevis, circiter 7.5 mm longis, haud sulcatis; seminibus plano-convexis, albumine ruminato.

An erect, glabrous shrub, the branchlets brown or reddish-brown, terete, smooth. Leaves chartaceous, castaneous and slightly shining when dry, both surfaces of the same color, 6 to 10 cm long, 1 to 2 cm wide, narrowly lanceolate, subequally narrowed to the acuminate base and apex; lateral nerves about 13 on each side of the midrib, slender, the reticulations lax, obscure, sometimes nearly obsolete; petioles slender, 1 to 1.5 cm long; stipules sheathing, about 5 mm long. Fruits terminal, ellipsoid, fascicled, sessile or shortly pedicelled, castaneous when dry, smooth, not at all sulcate, about 7.5 mm long, the pericarp rather brittle; seeds plano-convex, not sulcate; albumen ruminato.

LUZON, Ilocos Norte Province, Mount Nagapatan, *Bur. Sci.* 33212 Ramos (type), August 8, 1918, on dry slopes, altitude about 700 meters, fruits sessile; between Bangui and Claveria, *Bur. Sci.* 33061 Ramos, August 30, 1918, fruits shortly pedicelled.

The striking character of this species consists in the sessile or shortly pedicelled fruits which are borne in terminal fascicles of from two to five fruits each; these fascicles sometimes become lateral by the growth of young shoots after anthesis. It is otherwise strongly characterized by its castaneous, narrowly lanceolate leaves. Its alliance is with *Psychotria* (*Grumilea*) *fasciculiflora* Merr., from which it is readily distinguished by its much smaller, fewer-nerved leaves.

PSYCHOTRIA CARDIOPHYLLA sp. nov. § *Grumilea*.

Frutex erectus, plus minusve castaneo-pubescent; foliis oblongo-ellipticis ad obovatis, usque ad 18 cm longis, subcoriaceis, obtuse acuminatis, basi perspicue cordatis, in siccitate pallidis vel subtus brunneis, nervis utrinque circiter 16, valde perspicuis, curvatis, anastomosantibus, petiolis castaneo-pubescent, 1.5 ad 3 cm longis; inflorescentiis terminalibus, e basi 3-ramosis, ramis 3 cm longis, fructibus junioribus obovoideis, circiter 8 mm longis, laevis, haud sulcatis, subcapitato dispositis.

An erect shrub, the branchlets, petioles, inflorescences, and the lower surface of the leaves on the midribs and nerves castaneous-pubescent with short, rather harsh hairs. Branches terete, wrinkled, glabrous, grayish or brownish, about 4 mm in diameter. Leaves subcoriaceous, oblong-elliptic to oblong-obovate, 15 to 18 cm long, 6 to 9.5 cm wide, the upper surface pale, shining, the lower brownish or reddish-brown, the apex blunt-acuminate, base somewhat narrowed (3 to 4 cm) and abruptly and conspicuously cordate, the sinus narrow, the lobes rounded; lateral nerves about 16 on each side of the midrib, very prominent on the lower surface, somewhat curved, distinctly anastomosing, the primary reticulations distinct; petioles densely castaneous-pubescent, 1.5 to 3 cm long; stipules deciduous, not seen. Inflorescences terminal, castaneous-pubescent, 3-branched from the base, the branches about 3 cm long, each bearing at its apex a subcapitate infructescence 2 to 2.5 cm in diameter. Fruits 10 to 15 on each branch, the immature ones obovoid, about 8 mm long, smooth, not at all sulcate, dark-brown when dry, glabrous, their pedicels 3 to 5 mm long, pubescent.

LUZON, Tayabas Province, Infanta-Siniloan trail, *Bur. Sci.* 29166 Ramos & Edaña, June 12, 1917, along small streams in forests.

The alliance of this species is manifestly with *Psychotria alvarezii* Merr., from which it differs in its broader, differently shaped leaves and, especially, in its fruits, which are not at all longitudinally sulcate.

PSYCHOTRIA CORDATULA sp. nov. § *Grumilea*.

Frutex erectus, plus minusve castaneo-pubescent; foliis subcoriaceis, oblongo-lanceolatis, 15 ad 20 cm longis, acutis, basi abrupte et perspicue auriculato-cordatis, nervis utrinque circiter 20, perspicuis, patulis; petiolo 3 ad 4 cm longo; infructescentiis 3 ad 5 cm longis, simplex, fructibus glomeratim confertis, pedicellatis, subglobosis ad obovoideis, laevis, 5 ad 6 mm longis, pyrenis plano-convexis, haud carinatis, albumine ruminato.

An erect shrub, the branchlets, inflorescences, petioles, and the leaves on the lower surface more or less castaneous-pubescent with short hairs. Branches terete, glabrous, reddish-brown. Leaves subcoriaceous, oblong-lanceolate, 15 to 20 cm long, 4.5 to 6.5 cm wide, the apex acute or very obscurely acuminate, the base abruptly rounded and conspicuously auriculate-cordate 2.5 to 3 cm across the base, the sinus narrow, up to 8 mm deep, the upper surface glabrous, smooth; lateral nerves about 20 on each side

of the midrib, prominent, spreading, anastomosing; petioles 3 to 4 cm long. Infructescences terminal, usually 2 terminating each branchlet, 3 to 5 cm in length, unbranched, the fruits glomerately crowded at the apices of the peduncles, their pedicels 2 to 3 mm in length. Fruit black when dry, somewhat fleshy, subglobose to obovoid, smooth, 5 to 6 mm long, the pyrenes plano-convex, not at all ridged, the albumen ruminant.

LUZON, Bontoc Subprovince, Mount Masapilid, *Bur. Sci.* 37854 Ramos & Edaña, March 15, 1920, in the mossy forests, altitude about 1,250 meters.

This species is very strongly characterized by its relatively long petioles, its conspicuously auriculate-cordate leaf bases, and by its fruits being glomerately crowded at the apices of the peduncles. It is allied to *Psychotria cardiophylla* Merr. but has very differently shaped, more-numerously nerved leaves.

PSYCHOTRIA ELLIPTILIMBA sp. nov. § *Grumilea*.

Frutex erectus, glaber; foliis chartaceis, ellipticis ad oblongo-ellipticis, usque ad 10 cm longis, supra olivaceis, subtus pallidioribus, nitidis, apice rotundatis vel brevissime apiculatis, basi obtusis, nervis utrinque circiter 9, perspicuis; infructescentiis pedunculatis, trichotomis, fructibus sessilibus in apicem ramis primariis fasciculatis dispositis, oblongo-obovoideis, circiter 1 cm longis, in siccitate castaneis, leviter rugosis, haud sulcatis; pyrenis plano-convexis, albumine valde ruminato.

An erect, glabrous shrub, about 1 m high (*fide* Ramos). Leaves chartaceous, elliptic to oblong-elliptic, 6 to 10 cm long, 3 to 4.5 cm wide, the upper surface olivaceous, the lower paler, shining, apex rounded or minutely apiculate, base usually obtuse; primary lateral nerves about 9 on each side of the midrib, prominent, brownish to reddish-brown on the lower surface when dry, curved, scarcely anastomosing, the reticulations obsolete or nearly so; petioles 1.3 to 2 cm long; stipules deciduous, the stipular scar on the very young branchlets more or less pubescent. Inflorescences terminal, solitary, peduncled, trichotomous, 5 to 7 cm long, the peduncles 1.5 to 3 cm long, the primary branches 3 to 4 cm in length, each bearing at its tip a fascicle of three to six, sessile, oblong-obovoid fruits. Fruits red when fresh, castaneous when dry, about 1 cm long, somewhat rugose but not at all sulcate. Pyrenes plano-convex, not at all ridged or sulcate. Albumen prominently ruminant.

CATANDUANES, Santo Domingo River, *Bur. Sci.* 30534 Ramos, December 5, 1917, on forested slopes at low altitudes.

This species is well characterized by its vegetative and inflorescent characters. In the texture and color of its leaves it somewhat resembles *Psychotria subsessiliflora* Elm., but is not closely allied to that species, differing radically in leaf form and in its inflorescent characters.

PSYCHOTRIA FENICIS sp. nov.

Frutex erectus, glaber, 1 ad 2 m altus; foliis coriaceis, oblongo-ellipticis ad elliptico-ovatis, usque ad 15 cm longis, utrinque subaequaliter angustatis, basi acutis, apice breviter acuminatis; nervis lateralibus utrinque circiter 15, perspicuis, patulis, leviter curvatis, distincte anastomosantibus, reticulis distinctis; infructescentiis terminalibus, solitariis, brevibus, 2 ad 2.5 cm longis, e basi ramosis; fructibus paucis, obovoideis, circiter 9 mm longis, breviter pedicellatis, in siccitate rugosis; pyrenis plano-convexis, leviter sulcatis, seminibus obscure bicarinatis, albumine aequabile.

An erect, glabrous shrub, 1 to 2 m high. Leaves coriaceous, oblong-elliptic to elliptic-ovate, 11 to 15 cm long, 5 to 7 cm wide, subequally narrowed to the acute base and the rather shortly acuminate apex, somewhat shining, somewhat reddish-brown when dry, of about the same color on both surfaces, beneath usually pustulate; lateral nerves about 15 on each side of the midrib, spreading, slightly curved, distinctly anastomosing, prominent on both surfaces, the reticulations distinct; petioles 1 to 2 cm long. Panicles short, simple or branched from the base, 2.5 cm long or less, the basal branches 13 mm long or less. Fruits obovoid, about 9 mm long, greenish-yellow when fresh, when dry brown, rugose, their pedicels about 2 mm long. Pyrenes shallowly ridged. Seeds obscurely bicarinate, the albumen uniform.

LUZON, Pangasinan Province, Mount San Isidro, Labrador, *Bur. Sci.* 28814 (type), 29967 *Fénix*, November 4 and 9, 1917, on forested slopes and ridges, altitude 200 to 400 meters.

The species is well characterized by its short inflorescences, and rather thickly coriaceous, usually pustulate leaves. It is perhaps as closely allied to *Psychotria gitingensis* Elm. as any other species but is remote from it in vegetative, inflorescent, and fruit characters.

PSYCHOTRIA HETEROMERA sp. nov. § *Grumilea*.

Frutex erectus, perspicue ferrugineo- ad castaneo-ciliatus; foliis chartaceis ad subcoriaceis, oblongo-ellipticis ad oblongo-

obovatis, usque ad 10 cm longis, utrinque subaequaliter angustatis, apice acuminatis, basi acutis, nervis utrinque 9 ad 11; inflorescentiis plerumque e basi 3-ramosis, ramis 2 ad 3 cm longis, floribus omnibus sessilibus, subcapitato dispositis, 5- ad 7-meris, calycis circiter 8 mm longis, dentibus 2 ad 3 mm longis.

An erect shrub, the branchlets, petioles, leaves on both surfaces but especially beneath, and inflorescences prominently ciliate with ferruginous to castaneous, rather weak, spreading hairs. Branches terete, grayish to brownish, the internodes 4 to 7 mm long. Leaves chartaceous to subcoriaceous, dark-brown to brownish-olivaceous when dry, oblong-elliptic to oblong-obovate, 5 to 10 cm long, 2 to 4 cm wide, subequally narrowed to the acute base and to the sharply acuminate apex, somewhat shining, both surfaces with scattered, rather weak, spreading hairs, the upper surface often becoming glabrous, the midrib and nerves on the lower surface prominently ciliate; lateral nerves 9 to 11 on each side of the midrib, prominent, curved, anastomosing, the reticulations obsolete or nearly so; petioles 1 to 1.5 cm long, prominently ciliate; stipules membranaceous, broadly ovate, acuminate, usually lobed, for the most part glabrous but with some hairs on the back and the margins. Inflorescences usually 3-branched from the base, the branches 2 to 3 cm long, conspicuously castaneous-ciliate, each bearing at its apex a subcapitate partial inflorescence, the flowers all sessile and subtended by a pair of broadly ovate, pubescent, 3 to 4 mm long bracts, and each flower by an obovate to lanceolate, obtuse to acuminate, 3 to 4 mm long, ciliate bracteole, the individual heads about 1.5 cm in diameter. Calyx ovoid, about 8 mm long and 4 mm wide, slightly ciliate, the tube elongated and produced 4 to 5 mm above the ovary, the teeth 5 to 7, 2 to 3 mm long, ovate-lanceolate, acuminate. Corolla-tube cylindric, about 7 mm long, glabrous, the lobes 5 to 7, oblong, obtuse, about 5 mm long. Stamens 5 to 7, their filaments 3 mm long. Throat bearded.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28773 (type), 28602 Ramos & Edaño, May, 1917, in the mossy forest, altitude apparently about 1,000 meters.

This species is strongly characterized by its subcapitate partial inflorescences; its indumentum; its sessile, 5- to 7-merous flowers; and its relatively greatly produced calyx-tube. It somewhat resembles *Psychotria pilosella* Elm., but is not closely allied to that species.

PSYCHOTRIA LANCILIMBA sp. nov. § *Grumilea*.

Frutex glaber, scandens (?); foliis chartaceis, lanceolatis ad oblongo-lanceolatis, usque ad 12 cm longis, olivaceis, tenuiter acuminatis, basi acutis, nervis utrinque circiter 15, perspicuis, anastomosantibus, reticulis distinctis, densis; stipulis anguste oblongis, circiter 1 cm longis; infructescentiis simplicibus vel e basi ramosis, circiter 2 cm longis; fructibus obovoideis, sessilibus, in ramis primariis subcapitato-dispositis, circiter 8 mm longis, haud sulcatis; pyrenis plano-convexis, albumine ruminato.

A glabrous shrub, apparently scandent. Leaves chartaceous, lanceolate to oblong-lanceolate, olivaceous, shining, and of about the same color on both surfaces when dry, 8 to 12 cm long, 2 to 3 cm wide, narrowed upward to the slenderly acuminate apex and below to the cuneate base; primary nerves about 15 on each side of the midrib, prominent, curved, anastomosing, the reticulations distinct, the ultimate ones rather dense; petioles about 1 cm long; stipules narrowly oblong, deciduous, about 1 cm long. Infructescences terminal, solitary, about 2 cm long, simple or branched from the base, the branches never more than two. Fruits sessile, subcapitately arranged at the ends of the branches, obovoid, red when fresh, black when dry, smooth, about 8 mm long, not at all sulcate. Pyrenes plano-convex, not at all ridged; albumen ruminant.

LUZON, Rizal Province, Mount Lumutan, *Bur. Sci.* 29713 (type), 29629 Ramos, August 17 and 30, 1917, in the mossy forest, apparently at an altitude of about 1,000 meters.

In vegetative characters this species closely resembles *Psychotria pinnatinervia* Elm., but is totally different in its infructescence and in its fruit characters. The imperfect notes with the specimens would indicate that it is a small shrub, but the dried specimens have all the appearance of being from vines, while several of the branchlets bear rootlets at the nodes.

PSYCHOTRIA LONGIPETIOLATA sp. nov. § *Grumilea*.

Frutex vel arbor parva, glaberrima; foliis oblongis ad oblongo-ovatis, usque ad 25 cm longis, subolivaceis, nitidis, coriaceis vel subcoriaceis, superne angustatis, acutis, basi acutis vel leviter decurrento-acuminatis, nervis primariis utrinque 15 ad 20, perspicuis, anastomosantibus, reticulis distinctis; petiolo 4 ad 6 cm longo; paniculis pyramidatis, 8 ad 12 cm longis, ramis basilibus 2, patulis; fructibus numerosis, obovoideis, in siccitate brunneis ad atro-brunneis, leviter rugosis, longitudinaliter sul-

catis, 5 ad 7 mm longis; pyrenis plano-convexis, dorso late 3-carinato, albumine ruminato.

A shrub or small tree, entirely glabrous. Branches rugose, pale-brownish, the branchlets usually smooth, brown. Leaves oblong to oblong-ovate, 20 to 25 cm long, 7 to 10 cm wide, subolivaceous, of about the same color and shining on both surfaces when dry, narrowed upward to the acute apex and below to the acute to somewhat decurrent-acuminate base; primary lateral nerves 15 to 20 on each side of the midrib, conspicuous on both surfaces as are the reticulations, somewhat curved, anastomosing; petioles 4 to 6 cm long. Panicles pyramidal, with two primary branches from the base, the infructescences 8 to 12 cm long, the lower branches 6 to 7 cm long. Fruits numerous, reddish-yellow when fresh, brown to blackish-brown when dry, obovoid, somewhat rugose, shallowly sulcate, 5 to 7 mm long, their pedicels 2 to 3 mm in length. Pyrenes plano-convex, the back with three broad, not very conspicuous ridges or keels. Albumen ruminato.

CATANDUANES, Santo Domingo River and Mount Mariguison, *Bur. Sci.* 30418 (type), 30567, 30416 Ramos, November and December, 1917, on forested slopes.

This species, well characterized by its relatively large, long-petioled, thick leaves, is probably as closely allied to *Psychotria plumeriaefolia* Elm. as any other species.

PSYCHOTRIA LUCIDA sp. nov. § *Grumilea*.

Frutex vel arbor parva, glaberrima; foliis chartaceis, in siccitate rigidis, fragilis, olivaceis, utrinque concoloribus, nitidis, oblongo-lanceolatis ad oblongis, usque ad 17 cm longis, utrinque subaequaliter angustatis et acuminatis, nervis utrinque circiter 11, perspicuis, curvatis, anastomosantibus, reticulis laxissimis, obscuris; paniculis longe pedunculatis, usque ad 14 cm longis, ramis patulis, inferioribus usque ad 4 cm longis; fructibus subellipsoideis, in siccitate nigris, nitidis, rugosis, 7 ad 8 mm longis; pyrenis plano-convexis, albumine valde ruminato.

A shrub or small tree, entirely glabrous, the branches brownish or grayish, the branchlets brown, smooth. Leaves chartaceous, rigid and brittle when dry, oblong-lanceolate to oblong or even oblong-elliptic, 12 to 17 cm long, 3 to 6 cm wide, subequally narrowed to the acuminate apex and base, olivaceous, of the same color and shining on both surfaces when dry; lateral nerves about 11 on each side of the midrib, prominent, curved, anastomosing, the reticulations very lax, obscure; petioles 1.5

to 3 cm long; stipules ovate, acuminate, 5 to 7 mm long. Panicles terminal, solitary, including the peduncle 11 to 14 cm in length, the peduncles 7 to 8 cm long; branches spreading, the lower ones up to 4 cm in length. Fruits subellipsoid, yellowish when fresh, black and somewhat shining and slightly rugose when dry, 7 to 8 mm long, often with faint longitudinal lines but scarcely ridged or sulcate. Seeds plano-convex, the albumen very prominently ruminant.

LUZON, Rizal Province, Mount Lumutan, *Bur. Sci.* 29716 (type), 29632 Ramos & Edaña, August 23, 1917, in forests near the summit, apparently at an altitude of about 1,000 meters.

This species is in the group with *Psychotria malayana* Jack, and is probably as closely allied to *P. luconiensis* (Cham.) F.-Vill. as to any other species. It is readily distinguished by its larger leaves and long-peduncled panicles.

PSYCHOTRIA MAGNIFOLIA sp. nov.

Frutex 3 ad 4 m altus, glaber, vel inflorescentiis junioribus obscure pubescens; ramulis compressis, 1 ad 1.5 cm diametro; foliis obovatis ad oblanceolatis, usque ad 55 cm longis, brevissime et obtuse acuminatis, deorsum angustatis, basi acutis vel cuneatis, breviter petiolatis, nervis utrinque circiter 25; stipulis membranaceis, ovatis, ad oblongo-ovatis, 3 ad 5 cm longis; inflorescentiis e basi 3-ramosis, ramis elongatis, usque ad 20 cm longis, partibus floriferis 3 ad 6 cm longis, floribus fasciculato-confertis, pedicellatis, circiter 8 mm longis.

An erect, glabrous shrub, 3 to 4 m high, the branchlets stout, compressed, 1 to 1.5 cm in diameter, brownish. Leaves unusually large for the genus, obovate to oblanceolate, 45 to 55 cm long, 14 to 22 cm wide, subolivaceous and shining when dry, chartaceous, the apex broadly and shortly blunt-acuminate, below narrowed to the acute or cuneate base; lateral nerves about 25, prominent, curved, scarcely anastomosing, the reticulations lax, not prominent; petioles stout, 1.5 to 2.5 cm long; stipules membranaceous, nearly black when dry, ovate to oblong-ovate, acute, 3 to 5 cm long. Inflorescences 3-branched from the base, the central branch up to 20 cm in length, the lateral ones 10 to 15 cm long, flower-bearing only in the upper 3 to 6 cm, the flowers here fascicled, crowded, forming a subcylindric partial inflorescence, or interruptedly glomerate; pedicels about 6 mm long. Calyx turbinate, about 3 mm in diameter, the teeth 5, short. Corolla white, the tube 3 mm long, the lobes elliptic-ovate, acute, 5 mm long, the throat densely bearded.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28828 (type) Ramos & Edaño, May 11, 1917; Mount Tulaog, Ramos & Edaño s. n., May 24, 1917, along small streams in damp forests.

This species is remarkable for its unusually large leaves, which attain a length of 55 cm in the specimens examined. It is further strikingly characterized by its short petioles, very large and conspicuous stipules, and its narrow partial inflorescences, the inflorescence consisting of three branches, their peduncular portions greatly elongated. Fruiting material will probably show it to belong in the section *Grumilea*.

PSYCHOTRIA NAGAPATENSIS sp. nov.

Frutex erectus, ramulis et petiolis et subtus foliis ad costa dense subadpresse castaneo-hirsutis, ramis tenuibus, glabris, ramulis tenuissimis, circiter 1 mm diametro; foliis chartaceis, oblongis ad oblongo-oblongeolatis, usque ad 5 cm longis, nitidis, acutis vel obtusis, vel leviter acuminatis, basi cuneatis, nervis utrinque circiter 6, subtus distinctis; fructibus terminalibus, paucis, fasciculatis vel valde depauperato-cymosis, brevissime pedicellatis, laevis, anguste obovoideis, circiter 6 mm longis.

An erect, much-branched shrub, the branches slender, glabrous, the branchlets very slender, densely castaneous-hirsute with short, subappressed hairs as are the petioles and the midrib on the lower surface of the leaves. Leaves chartaceous, oblong to oblong-oblongeolate, more or less brownish when dry, shining, 4 to 5 cm long, 1.3 to 2 cm wide, the apex acute, obtuse, or somewhat acuminate, base cuneate; lateral nerves 6 on each side of the midrib, slender, distinct on the lower surface, anastomosing, the reticulations lax, evanescent; petioles 5 to 7 mm long. Infructescences terminal, very short, the fruits few, either fascicled or in very greatly reduced cymes, the peduncle, when present, not exceeding 2 mm in length, 2 to 5 fruits at the tip of each branchlet; fruits narrowly obovoid, glabrous, dark-brown or black when dry, smooth, glabrous, shining, not at all ridged or sulcate, about 6 mm long, subsessile or very shortly pedicellate, the pedicels not exceeding 1 mm in length.

LUZON, Ilocos Norte Province, Mount Nagapatan, *Bur. Sci.* 33193 Ramos, August 8, 1918, on dry slopes, altitude about 700 meters.

This species is well characterized by its small leaves and its fascicled or at most very depauperate-cymose, small, non-sulcate fruits. It apparently belongs in the section *Grumilea*, although

the seeds are not sufficiently developed to determine this point. In the characters of its infructescence it approaches *Psychotria papillata* Merr., although it is not otherwise closely allied to this species, differing remarkably in its smaller, fewer-nerved, differently shaped leaves and entirely different indumentum.

PSYCHOTRIA OBSCURINERVIA sp. nov. § *Grumilea*.

Frutex scandens, glaber; foliis chartaceis ad subcoriaceis, in siccitare pallidis, usque ad 6.5 cm longis, oblongis, utrinque subaequaliter angustatis, apice obtusis ad latissime obtuseque acuminatis, basi cuneatis, nervis utrinque 5 vel 6, valde inconspicuis; infructescentiis terminalibus, pedunculatis, pyramidatis, usque ad 16 cm latis, diffusis, multifloris; fructibus anguste ellipsoideis, circiter 4.5 mm longis, laevis, pericarpio haud carnosio, seminibus plano-convexis, haud sulcatis, albumine ruminato.

A scandent, glabrous shrub, the branches terete, reddish-brown or brownish, 3 to 5 mm in diameter, smooth, their internodes 1 to 1.5 cm long. Leaves chartaceous to subcoriaceous, pale when dry, somewhat shining, oblong, 4 to 6.5 cm long, 1.5 to 2.5 cm wide, subequally narrowed to the cuneate base and to the obtuse or broadly and obtusely acuminate apex; lateral nerves 5 or 6 on each side of the midrib, very slender, obscure, the reticulations obsolete; petioles about 5 mm long; stipules caducous. Inflorescences terminal, peduncled, pyramidal, diffuse, many-flowered, 13 to 16 cm wide, about 10 cm long excluding the 5 to 6 cm long peduncle, the primary branches opposite, spreading, few, these branches at or above the middle, the branchlets opposite. Pedicels 1 to 2 mm long. Calyx about 1 mm long, truncate or obscurely 4-toothed. Corolla about 4.5 mm long, the lobes 2 mm long. Fruit narrowly ellipsoid, pale brownish when dry, not fleshy, about 4.5 mm long, smooth, not at all sulcate or ridged, the pericarp thin; pyrenes plano-convex; seeds plano-convex, not ridged, albumen somewhat ruminant.

LUZON, Ilocos Norte Province, between Bangui and Claveria, *Bur. Sci.* 33077 Ramos, August 30, 1918, in forests at low altitudes.

Among the scandent, glabrous Philippine species with peduncled, diffuse inflorescences the present one is readily distinguished by its very obscurely nerved leaves, the reticulations being obsolete, the lateral nerves very slender and obscure.

PSYCHOTRIA PALLIDIFOLIA sp. nov.

Frutex erectus, glaber; foliis firmiter chartaceis ad subcoriaceis, oblongis ad oblongo-lanceolatis, in siccitate pallidis, nitidis, usque ad 15 cm longis, acuminatis, basi acutis, nervis utrinque circiter 10, curvatis, anastomosantibus, utrinque cum reticulis perspicuis; paniculis usque ad 4 cm longis, e basi ramosis, ramis paucis; fructibus obovoideis, 6 ad 7 mm longis, longitudinaliter perspicue carinatis; pyrenis plano-convexis, dorso perspicue bicarinatis, albumine aequabile.

An erect glabrous shrub, the branches brownish, or the younger ones subolivaceous. Leaves firmly chartaceous to subcoriaceous, pale and shining when dry, of the same color on both surfaces, oblong to oblong-lanceolate, 9 to 15 cm long, 3 to 5 cm wide, subequally narrowed to the acute base and the distinctly acuminate apex; lateral nerves about 10 on each side of the midrib, curved, sometimes ascending, anastomosing, distinct on both surfaces as are the rather close reticulations; petioles 5 to 10 mm long. Panicles terminal, up to 4 cm long in fruit, with two primary lateral branches from the base, the flowers somewhat crowded on the primary branches. Fruits obovoid, 6 to 7 mm long, rather prominently sulcate and ridged when dry, their pedicels 1 to 2 mm long. Pyrenes plano-convex, prominently 2-keeled, the seeds conforming to the pyrenes, the albumen uniform, not at all ruminant.

CATANDUANES, Mount Mariguion and vicinity of Cololbong, *Bur. Sci.* 30510 (type), 30446, 30320 Ramos, November and December, 1917, on forested slopes.

This species resembles the imperfectly known *Psychotria negrosensis* Elm., differing radically in the shape of its leaves. It is perhaps as closely allied to this species as to any other described form.

PSYCHOTRIA PANAYENSIS sp. nov.

Frutex erectus, inflorescentiis minute puberulis exceptis glaber; foliis oblongis ad oblongo-obovatis, membranaceis vel chartaceis, 15 ad 20 cm longis, apice breviter obtuse acuminatis, nervis utrinque 12 ad 14, perspicuis; paniculis brevibus, circiter 3 cm longis et 5 cm latis, ramis verticillatis; fructibus obovoideis, haud sulcatis, 7 mm longis, seminibus plano-convexis, albumine aequabile.

An erect shrub, glabrous except in minutely puberulent inflorescences, the indumentum obscure, usually castaneous. Leaves oblong to oblong-obovate, membranaceous to chartaceous, 15 to 20 cm long, usually 5 to 8 cm wide, or in the extreme form 10 cm wide, brownish or somewhat olivaceous when dry, base acute or slightly decurrent-acuminate, apex slightly obtuse-acuminate; lateral nerves 12 to 14 on each side of the midrib, rather distant, somewhat curved, prominent on the lower surface, anastomosing, the primary reticulations rather distinct and somewhat lax; petioles 2 to 3 cm long; stipules deciduous. Panicles terminal, 3 to 3.5 cm long, about 5 cm wide, branched from the base or shortly peduncled, the branches verticillate, spreading, the lower ones 2 to 2.5 cm long, each branch usually dichotomous or trichotomous above, the ultimate branchlets usually bearing about three white flowers, their pedicels 1 to 2 mm long. Calyx about 2 mm long and wide, obscurely 4-toothed, corollatube 3 mm long, the lobes oblong-ovate, reflexed, 2 mm long, throat bearded. Styles slender, 4 mm long. Fruits obovoid, not sulcate, glabrous, about 7 mm long, brown or black when dry. Seeds plano-convex, not rigid, the albumen not ruminate.

PANAY, Capiz Province, Jamindan, *Bur. Sci.* 31198 (type), 31042 Ramos & Edaña, April and May, 1918, in damp forests along small streams. No. 31335 of the same collection unquestionably represents the same species, this being the form with leaves about 10 cm in width.

The alliances of this species are not entirely clear. It is sufficiently well characterized by its short, minutely puberulent inflorescences, the plants otherwise glabrous, associated with its obovoid fruits which are not ridged, and its seeds which are not at all ruminate.

PSYCHOTRIA PIPERI sp. nov.

Frutex scandens, inflorescentiis dense griseo-puberulis exceptis glaber; ramis ramulisque brunneis, teretibus; foliis oblongis ad oblongo-ovatis, chartaceis vel subcoriaceis, usque ad 14 cm longis, in siccitate brunneo-olivaceis, nitidis, basi rotundatis, apice acuminatis, nervis utrinque circiter 14, perspicuis; inflorescentiis terminalibus, paniculatis, pedunculatis, cum pedunculo circiter 16 cm longo; floribus extus griseo-puberulis, circiter 8 mm longis.

A scandent shrub, quite glabrous except the puberulent inflorescence. Branches and branchlets glabrous, smooth, terete,

brown or reddish-brown, 4 to 5 mm in diameter. Leaves oblong to oblong-ovate, firmly chartaceous or subcoriaceous, 11 to 14 cm long, 5 to 7.5 cm wide, brownish-olivaceous when dry, the lower surface paler than the upper, both shining, base rounded, apex rather prominently acuminate; lateral nerves about 14 on each side of the midrib, curved-spreading, anastomosing near the margin, prominent, the primary reticulations lax, very distinct; petioles 1 to 2.5 cm long; stipules deciduous, the scars prominent. Inflorescence terminal, paniculate, including the peduncle about 16 cm long, the peduncle about 8 cm long, glabrous, the branchlets and flowers gray-puberulent, the branches few, the lower pair about 6 cm long, branched above the middle, the inflorescence about 11 cm wide. Flowers puberulent externally, about 8 mm long, pedicelled. Calyx about 2 mm in diameter, rather shallow, distinctly toothed. Corolla-tube slightly enlarged upward, about 5 mm long, the lobes oblong, obtuse, about 2.5 mm long.

MINDANAO, Surigao Province, Hinatuan, C. V. Piper 513, May 16, 1911. DINAGAT, *Bur. Sci.* 35188 Ramos & Pascasio. In forests at low altitudes.

This species is apparently allied to *Psychotria ramosissima* Elm. and *P. lianoides* Elm., and distinctly nearer the latter. It differs, however, among other characters, in its longer flowers and densely puberulent inflorescences.

PSYCHOTRIA PYGMAEA sp. nov.

Frutex erectus, circiter 30 cm altus, parce ramosus, glaber; foliis chartaceis, oblongis ad oblongo-obovatis, usque ad 10 cm longis, nitidis, breviter petiolatis, acutis, basi cuneatis, nervis utrinque circiter 8, distinctis, reticulis obscuris vel subobsoletis; infructescentiis, fructibus exceptis, haud 1 cm longis, trichotomis, ramis brevissimis; fructibus oblongo-ellipsoideis, circiter 7 mm longis, breviter pedicellatis, longitudinaliter sulcatis; pyrenis plano-convexis, perspicue 4-carinatis, albumine aequabile.

An erect, sparingly branched, glabrous shrub or undershrub, about 30 cm high, the stems terete, not more than 4 mm in diameter. Leaves oblong, rarely somewhat oblong-obovate, chartaceous, shining, the upper surface usually olivaceous, the lower usually brown tinged with red when dry, 6 to 10 cm long, 2 to 3.5 cm wide, the apex acute, base gradually narrowed, cuneate; lateral nerves about 8 on each side of the midrib, slender but distinct, curved, obscurely anastomosing, the reticulations obscure or subobsolete; petioles 2 mm long or less;

stipules ovate, acuminate, about 4 mm long, deciduous, the stipular scar on the branchlets usually castaneous-villous. Inflorescences terminal, solitary, less than 1 cm long without the fruits, 3-branched, the branches short, each bearing at its tip from 1 to 5 shortly pedicelled, oblong-ellipsoid, 7 mm long fruits. Bracteoles ovate-lanceolate, acuminate, about 3 mm long. Fruits dark-purple or black when fresh, castaneous when dry, longitudinally sulcate, their pedicels 1 mm long or less. Pyrenes plano-convex, prominently 4-keeled, the albumen uniform.

LUZON, Rizal Province, Mount Susong Dalaga, *Bur. Sci.* 29271 Ramos, August 14, 1917, in forests.

This species is well characterized by its small size, in size resembling *Psychotria repens* Elm. It differs radically from Elmer's species not only in its habit, but also in being entirely glabrous except for its pubescent stipular scars.

PSYCHOTRIA SCABERULA sp. nov.

Frutex erectus, inflorescentiis leviter hirsutis vel pubescens, foliis subtus scabridis; foliis chartaceis, oblongo-ellipticis ad elliptico-obovatis, olivaceis, 16 ad 20 cm longis, breviter acuminatis, basi decurrentibus, nervis utrinque circiter 15, perspicuis; inflorescentiis circiter 3 cm longis, ramis primariis paucis, usque ad 2 cm longis, floribus sessilibus, in capitulis globosis circiter 1.5 cm diametro dispositis, calycis usque ad 8 mm longis.

An erect shrub or small tree, the inflorescences slightly hirsute or pubescent with short hairs, the leaves distinctly scabrid on the lower surface by scattered, short, stiff, projecting hairs. Leaves chartaceous, oblong-elliptic to elliptic-obovate, dark olivaceous when dry, 16 to 20 cm long, 7.5 to 11 cm wide, the apex shortly acuminate, the base somewhat decurrent, the upper surface smooth, glabrous, the lower surface distinctly hirsute with short hairs on the midrib and nerves and with short, projecting, stiff hairs from thickened bases on the epidermis; lateral nerves about 15 on each side of the midrib, distinct, the reticulations lax, not prominent; petioles about 4 cm long. Inflorescences terminal, 3 cm long or less, sparingly branched, the primary branches 2 cm long or less, somewhat hirsute, each bearing a rather dense, globose head of sessile flowers, about 1.5 cm in diameter. The calyces up to 8 mm long, the limb distinctly produced above the ovary.

DINAGAT, *Bur. Sci.* 35159 Ramos & Pascasio, May 11, 1919, in forests at low altitudes.

This species is apparently allied to *Psychotria velutina* Elm. which it closely resembles in many characters. It is distinguished, however, by its leaves being distinctly scabrous and not softly pubescent beneath, and by its longer, glabrous petioles.

PSYCHOTRIA TRICARPA sp. nov.

Frutex erectus, ramulis petiolisque castaneo-pubescentibus; foliis chartaceis, glabris, oblongo-obovatis, abrupte acuminatis, basi cuneatis, 8 ad 12 cm longis, nervis utrinque 10, perspicuis; fructibus paucis, terminalibus, sessilibus, ovoideis, in siccitate brunneis, 8 mm longis, haud sulcatis; albumine aequabile.

An erect shrub, the branchlets and petioles rather conspicuously pubescent with weak, short, somewhat crisped, spreading, castaneous hairs, the branches terete, glabrous, slender, the internodes 4 to 12 cm long. Leaves chartaceous, oblong-obovate, rather abruptly acuminate, the acumen short, acute, somewhat narrowed below to the cuneate base, 8 to 12 cm long, 3 to 6 cm wide, somewhat shiny and brownish when dry; lateral nerves about 10 on each side of the midrib, prominent on the lower surface, somewhat curved, distinctly anastomosing, the reticulations evident; petioles 1 to 2 cm long. Fruits sessile, usually 3 at the tip of each branchlet, ovoid, brown when dry, about 8 mm long, the pericarp rather thick, not at all sulcate. Seeds plano-convex, not sulcate or ridged, the albumen uniform.

PANAY, Capiz Province, Jamindan, *Bur. Sci.* 31224 Ramos & Edaña, May 17, 1918, in damp forests.

This species in the disposition of its fruits resembles *Psychotria euphlebia* Merr., from which it is very easily distinguished by its pubescence and its fewer-nerved leaves; in the present species the albumen is not at all ruminant while in *P. euphlebia* it is distinctly so.

RANDIA Linnaeus

RANDIA ROSTRATA sp. nov.

Frutex vel arbor parva, glabra; foliis chartaceis, oblongis ad oblongo-lanceolatis, nitidis, 6 ad 11 cm longis, utrinque subaequaliter angustatis, basi cuneatis, apice tenuiter acuminatis, nervis utrinque plerumque 5, tenuibus, distinctis; fructibus axillaribus, plerumque solitariis, pedunculatis, anguste ellipsoideis, 12 ad 14 mm longis, utrinque angustatis, basi leviter acuminatis, apice rostratis, calycis dentibus linearis, 1.5 ad 2.5 mm longis, glabris.

A glabrous, unarmed shrub or small tree. Leaves chartaceous, oblong to oblong-elliptic or oblong-lanceolate, pale olivaceous and shining when dry, 6 to 11 cm long, 2 to 4 cm wide, subequally narrowed to the slenderly acuminate apex and the cuneate or somewhat decurrent base; lateral nerves usually 5 on each side of the midrib, slender, distinct, the reticulations lax, sometimes obsolete; petioles about 5 mm long; stipules lanceolate, acuminate, from a broadened base, about 3 mm long. Fruits axillary, usually solitary, peduncled, narrowly ellipsoid, 12 to 14 mm long, black when dry, the base narrowed, somewhat acuminate, the apex rather prominently rostrate, glabrous, crowned by the somewhat produced, rather narrow, cylindric calyx-tube and by the linear, 1.5 to 2.5 mm long calyx-teeth; pedicels 1.5 to 2.5 cm long, slender, their basal parts supplied with 1 or 2 pairs of small bracts.

BUCAS GRANDE, *Bur. Sci.* 35102 Ramos & Pascasio, June 11, 1919, in dry forests.

A species well characterized by its slenderly acuminate leaves and by its long-pedicelled, distinctly rostrate fruits. It somewhat resembles *Randia samalensis* Elm. but differs radically in its glabrous calyces, elongated pedicels, etc.

TARENNA Gaertner

Many botanists have maintained *Webera* Schreber (1791) as the valid generic name for a rather ill-defined group of rubiaceous plants, consistently overlooking the fact that *Webera* Hedw. (1782), a valid and universally recognized genus of mosses, invalidates Schreber's use of the same name for a genus of the Rubiaceae. Schreber cited *Chomelia* Linn. as a synonym of his genus, but under our present rules of nomenclature *Chomelia* Linn. has no standing, and is, moreover, invalidated by *Chomelia* Jacquin. *Webera*, as defined by Schreber, has two-celled, two-seeded fruits, and hence cannot be a synonym of *Tarenna* Gaertner. *Tarenna* Gaertner² was based on a Ceylon specimen, the species being known to the natives as *tarennae*. While Gaertner specifically described the flowers as 4-merous, there is every reason to believe that this statement is an error, and that the plant he had in mind is the form described by Linnaeus as *Rondeletia asiatica* Linn., and described by Trimen³ as *Webera corymbosa* Willd. Trimen gives *Rondeletia asiatica* Linn., *Ta-*

² Fruct. 1 (1788) 139, t. 28.

³ Fl. Ceylon 2 (1894) 328.

renna zeylanica Gaertn., and *Stylocoryne webera* A. Rich. as synonyms; the proper specific name for the species would seem to be *Tarenna asiatica* (Linn.) O. Kuntze.

However, *Tarenna* is not the first name proposed for this group, as *Cupi* Adanson⁴ is manifestly congeneric with Gaertner's *Tarenna*. This generic name, being objectionable in form, and being published without a binomial, has little claim to recognition, and I believe that it should be discarded in favor of *Tarenna*. Later (1830) de Candolle modified the name to *Cupia*. *Cupi* Adanson was based wholly on *Cupi* Rheede⁵ which is manifestly a *Tarenna* as here interpreted.

Hooker f.⁶ retained the generic name *Webera*, but included under it two sections: *Euwebera*, including those plants having two or more ovules in each cell of the ovary, namely *Tarenna*; and *Pseudixora*, those species having but one ovule in each cell of the ovary. It is exceedingly illogical to include in the Rubiaceae one-ovulate and several-ovulate species in the same genus, and it is not considered that Hooker's description of the species is correct. King⁷ recognized that the grouping of *Euwebera* and *Pseudixora* in a single genus is incorrect, retained *Webera* for Hooker's section *Euwebera*, and placed the species of *Pseudixora* under *Stylocoryna* Cav.; however, the type and sole species described by Cavanille under *Stylocoryna* is a *Randia*, *R. racemosa* (Cav.) F.-Vill., so that *Stylocoryna* King non Cav. becomes a synonym of *Tarenna*. The general conclusions regarding *Tarenna*, *Cupi*, and *Cupia* are in conformity with those of Wernham.⁸

The Philippine species of *Tarenna* are as follows:

TARENNA ACUMINATA sp. nov.

Arbor parva, circiter 5 m alta, partibus junioribus et inflorescentiis et foliis subtus ad costa nervisque perspicue ciliatis; foliis oblango-oblancoatis, membranaceis, olivaceis, nitidis, usque ad 17 cm longis, apice tenuiter acute acuminatis, basi cuneatis, nervis utrinque 9 ad 12, perspicuis; infructescentiis brevibus, circiter 3 cm longis, breviter pedunculatis, corymbosis;

⁴ Fam. Pl. 2 (1763) 158.

⁵ Hort. Malabar. 2 (1679) 37, t. 23.

⁶ Fl. Brit. India 3 (1880) 101.

⁷ Journ. As. Soc. Bengal 72² (1903) 108.

⁸ Wernham, H. F., The nomenclature of *Tarenna*, Journ. Bot. 51 (1913) 58, 59.

fructibus globosis, circiter 7 mm diametro, seminibus 4, concavo-convexis.

A small tree, about 5 m high, the younger parts, inflorescences, and leaves on the midrib and nerves beneath prominently ciliate with pale or subferruginous, rather stiff hairs. Branches terete, dark reddish-brown, glabrous, the branchlets slender, somewhat angled or sulcate. Leaves membranaceous to subchartaceous, olivaceous and shining when dry, oblong-oblancheolate, 10 to 17 cm long, 3 to 5 cm wide, narrowed upward to the slenderly and sharply acuminate apex, and below to the cuneate base, the upper surface glabrous, smooth, or the midrib slightly pubescent, the lower surface somewhat paler, conspicuously ciliate on the midrib and nerves, and with fewer hairs on the reticulations; lateral nerves 9 to 12 on each side of the midrib, prominent, curved-ascending, anastomosing, the reticulations lax, distinct; petioles ciliate, 1 to 1.5 cm long; stipules lanceolate or ovate-lanceolate, acuminate, about 8 mm long, sparingly ciliate on the back. Infructescences terminal, short, ciliate, about 3 cm long, trichotomous, the peduncles 1.5 cm long or less. Fruits few, globose, dark-brown or black when dry, glabrous or with few scattered hairs, about 7 mm in diameter. Seeds 4, somewhat triangular in outline, thick, concavo-convex.

LUZON, Apayao Subprovince (not Cagayan Province as indicated on the herbarium label), between Tamoc and Dabba, *Bur. Sci.* 13904 (type), 13958 *Ramos*, February, 1912.

This species is well characterized by its short infructescences, its few fruits, its slenderly and sharply acuminate leaves, and its indumentum.

TARENNA CATANDUANENSIS sp. nov.

Frutex subglaber; foliis oblongis ad oblongo-ellipticis, firmiter chartaceis, usque ad 30 cm longis, supra laevis, glabris, nitidis, pallide olivaceis, subtus parcissime puberulis et minutissime scaberulis, apice tenuiter acute acuminatis, basi acutis, nervis utrinque circiter 9, valde perspicuis, arcuato-anastomosantibus; infructescentiis leviter pubescentibus, cymosis, pedunculatis, circiter 8 cm longis; fructibus globosis, 8 ad 10 mm diametro, glabris, in siccitate rugosis; seminibus 4 ad 6, angulatis, subcupulatis, rugosis.

A nearly glabrous shrub, the branches obscurely angled or somewhat compressed. Leaves firmly chartaceous, oblong to oblong-elliptic, 17 to 30 cm long, 6.5 to 10.5 cm wide, base acute, apex slenderly and sharply acuminate, the upper surface

smooth, glabrous, pale-olivaceous, shining, the lower very slightly puberulent and minutely scaberulous, of about the same color as the upper surface; lateral nerves 9 on each side of the midrib, very prominent, curved, arched-anastomosing, the reticulations prominent, lax; petioles about 3 cm long. Infructescences about 8 cm long and about as wide, trichotomously branched, the peduncles about 2 cm long, slightly pubescent, the bracts lanceolate, acuminate, 5 to 7 mm long. Fruits yellow when fresh, when dry pale to black, rugose, glabrous, globose, 8 to 10 mm in diameter, each containing from 4 to 6 seeds, the seeds irregular, angular, somewhat cupped, rugose.

CATANDUANES, *Bur. Sci.* 30387 Ramos, December 2, 1917, in forests along Santo Domingo River at low altitudes.

The alliance of this species is with *Tarenna scaberula* Merr., from which it is distinguished by its larger, differently shaped, fewer-nerved leaves, which are smooth and glabrous above and only very obscurely puberulent beneath. Like *T. scaberula* it belongs in the group that in facies simulates *Pavetta*, but is distinguished from *Pavetta* in having several seeds in each cell.

TARENNA ELONGATA sp. nov.

Frutex glaber vel leviter pubescens; foliis lanceolatis, coriaceis, 17 ad 30 cm longis, utrinque subaequaliter angustatis, basi cuneatis, apice acuminatis, nervis utrinque 7 vel 8, adscendentibus, perspicuis; inflorescentiis usque ad 12 cm longis, ramis paucis; calycis leviter urceolatis, circiter 4 mm longis, corollae tubo brevissimo, lobis circiter 8 mm longis; fructibus globosis, 8 mm diametro, seminibus 10 ad 12, angulatis.

A shrub, about 2 m high, glabrous or sparingly pubescent, the branches reddish-brown. Leaves lanceolate, coriaceous, 17 to 30 cm long, 3 to 6 cm wide, olivaceous, somewhat shining, subequally narrowed to the distinctly acuminate apex and to the cuneate or somewhat decurrent base; lateral nerves usually 7 or 8 on each side of the midrib, curved, ascending, prominent; petioles 2 to 3.5 cm long; stipules ovate to lanceolate, acuminate, up to 1 cm long. Inflorescences terminal, peduncled or branched from the base, up to 12 cm long, the branches few, spreading, glabrous or somewhat pubescent, few-flowered. Calyx somewhat urceolate, about 4 mm long, the corolla-tube very short, the lobes up to 8 mm in length. Fruits globose, black when dry, shining, about 8 mm in diameter, 10- to 12-seeded, the seeds angular, about 4 mm long.

DINAGAT, *Bur. Sci.* 35218 Ramos & Pascasio, May 11, 1919, in forests at low altitudes. *Bur. Sci.* 35076 Ramos & Pascasio, from the neighboring island of Bucas Grande, undoubtedly represents the same species; this number differs from the type in having its leaves somewhat pubescent beneath.

A species well characterized by its coriaceous, lanceolate, rather few-nerved leaves, which attain a length of 30 cm and are from 3 to 6 cm in width.

TARENNA LITTORALIS sp. nov.

Frutex 3 ad 5 m altus, inflorescentiis cinereo-pubescentibus exceptis glaber; foliis oblongis ad oblongo-ellipticis, subcoriaceis, usque ad 17 cm longis, in siccitate nitidis, utrinque nigricantibus, basi acutis vel acuminatis, apice distincte acuminatis, nervis utrinque 8 ad 10, distinctis; inflorescentiis corymbosis circiter 6 cm longis, multifloris, breviter pedunculatis vel e basi ramosis, cinereo-pubescentibus; floribus albis, 5-meris, calycis extus dense pubescentibus, 3 mm longis, truncatis vel subtruncatis; corollae tubo circiter 6 mm longo, lobis oblongis, obtusis, 6 mm longis; fructibus globosis, nigris, nitidis, circiter 6 mm diametro, seminibus circiter 5, subtriangularibus, concavo-convexis.

A shrub, 3 to 5 m high, glabrous except the inflorescence. Branches grayish or brownish, terete, the branchlets somewhat compressed or sulcate. Leaves when dry rather uniformly blackish, and shining on both surfaces, subcoriaceous, oblong to oblong-elliptic, 10 to 17 cm long, 4 to 7 cm wide, subequally narrowed to the acute or acuminate base and to the distinctly acuminate apex, the acumen acute or subobtuse; lateral nerves 8 to 10 on each side of the midrib, distinct; petioles 1 to 3 cm long; stipules broadly ovate, obtuse to acute, 5 to 8 mm long. Inflorescences terminal, corymbose, conspicuously cinereous-pubescent with short appressed hairs, in fruit becoming nearly glabrous, about 6 cm long and about as wide as long, shortly peduncled or branched from the base. Flowers numerous, white, 5-merous, their pedicels up to 3 mm long, the bracteoles less than 1 mm long. Calyx pubescent, ovoid or slightly urceolate, 3 mm long, truncate or subtruncate, the teeth, if at all evident, very short and obtuse. Corolla-tube about 7 mm long, glabrous, the throat densely villous, the lobes oblong, obtuse, 6 mm long, 2.5 mm wide. Anthers 6 mm long. Style and stigma 15 mm long, the style pubescent in the middle, the stigma cylindric, grooved. Fruits globose, black and shining when dry, about 6

mm in diameter, each containing about 6 seeds, the seeds dark-brown, shining, suborbicular to roughly triangular in outline, concavo-convex.

PALAWAN, Apulit Island, Taytay Bay, *Merrill 9418* (type), May, 1913; near Puerto Princesa, *For. Bur. 3533, 4523, 7460 Curran*, January and June, 1906. DUMARAN, *Bur. Sci. 21623 Escritor*, August, 1913. APO (Mindoro Strait), *Merrill 412*, December, 1902. UBIAN, *Merrill 5390*, October, 1906. LUZON, Pangasinan Province, Bolinao, *For. Bur. 8380 Curran & Merritt*, December, 1907: Zambales Province, *Bur. Sci. 5105 Ramos*, December, 1907.

This species grows in forests and thickets immediately back of the beach, all the specimens cited being rather remarkably uniform in appearance and characters. Its alliance is with *Tarenna fragrans* Koord. & Val., from which it differs in numerous characters, notably in its much shorter flowers, glabrous corolla, and fewer-nerved leaves. Some of the specimens cited above are the basis of the Philippine reference of *Stylacoryne webera* Wallich.⁹ It is apparently more closely allied to *Tarenna asiatica* (Linn.) O. Kuntze than it is to *T. fragrans* Koord. & Val.

TARENNA NITIDA sp. nov.

Arbor circiter 5 m alta, inflorescentiis parvis pubescentibus exceptis glabra; foliis chartaceis, olivaceis, nitidis, oblongo-ellipticis ad ovato-ellipticis, usque ad 12 cm longis, utrinque acuminatis, nervis utrinque circiter 6, distinctis; inflorescentiis circiter 4.5 cm longis, brevissime pedunculatis vel e basi ramosis, paucifloris; floribus circiter 2 cm longis, 5-meris, corollae tubo 6 mm longo, lobis oblongis, apiculatis, 10 mm longis; loculis biovulatis.

A small tree, about 5 m high, entirely glabrous except the slightly pubescent inflorescence. Branches terete, brownish or grayish, the branchlets usually olivaceous, slender, and often sulcate. Leaves chartaceous, olivaceous and prominently shining on both surfaces when dry, oblong-elliptic to ovate-elliptic, 8 to 12 cm long, 4 to 5.5 cm wide, subequally narrowed to the distinctly acuminate apex and the decurrent-acuminate base; lateral nerves about 6 on each side of the midrib, prominent, anastomosing; petioles about 1 cm long; stipules broadly ovate, obtuse to acuminate, about 6 mm long. Inflorescences corymbose, few-flowered, sessile or shortly peduncled, about 4.5 cm long including

⁹ Elm. Leaf. Philip. Bot. 1 (1906) 33.

the flowers, the rachis, branches, pedicels, and calyces uniformly pubescent with short, scattered, appressed, cinereous hairs. Flowers white, 5-merous. Calyx 5 mm long, the limb produced 3 mm above the ovary and conspicuously 5-toothed, the teeth lanceolate, acuminate, 1.5 mm long. Corolla-tube 6 mm long, somewhat pubescent within, bearded at the throat, the lobes 5, oblong, apiculate, 10 mm long, 3.5 mm wide. Anthers straight, slender, 10 mm long. Ovary 2-celled; cells 2-ovuled; style and stigma 1.8 cm long, slightly exserted, the style pubescent, the stigma grooved.

NEGROS, San Carlos, *For. Bur. 23388 Contreras*, May 16, 1914, in thickets at low altitudes.

This species is well characterized by being entirely glabrous except its sparingly appressed-pubescent inflorescences. Its alliance is with *Tarenna eucrantha* (Elm.) Merr. and *T. palawanensis* (Elm.) Merr., but it is very distinct from both.

TARENNA OBTUSIFOLIA sp. nov.

Frutex vel arbor parva, inflorescentiis parce pubescentibus exceptis glaber; foliis oblongis, obtusis, usque ad 13 cm longis, in siccitate nigricantibus, nitidis, nervis utrinque circiter 8, distinctis; inflorescentiis terminalibus, corymbosis, breviter pedunculatis vel e basi ramosis; floribus 5-meris, calycis distincte 5-dentatis, corollae tubo glabro, 5 mm longo, lobis distincte brevioribus, circiter 3.5 mm longis; stylis glabris.

A shrub or small tree, glabrous except the inflorescence which is sparingly cinereous-pubescent with short appressed hairs. Branches terete, brownish, the branchlets rather distinctly 4-angled and often sulcate. Leaves firmly chartaceous to subcoriaceous, black and shining on both surfaces when dry, oblong, 7 to 13 cm long, 3 to 5 cm wide, base somewhat acuminate, often inequilateral, the apex obtuse, usually rounded, never acuminate; lateral nerves about 8 on each side of the midrib, distinct, the reticulations lax, slender; petioles 2 to 3 cm long; stipules broadly ovate, acuminate, about 5 mm long. Inflorescences terminal, shortly peduncled or branched from the base, about 6 cm long and about as broad, sparingly appressed-pubescent with short hairs. Calyx ovate-urceolate, 2 mm long, slightly pubescent, with 5 distinct, broad, short teeth. Corolla-tube glabrous, 5 mm long, the throat densely villous, the lobes 5, oblong, obtuse, 3.5 mm long and 1.6 mm wide. Anthers 3 mm long. Style and stigma 11 mm long, the style glabrous, the stigma cylindric, slender, obscurely grooved; ovules several in each cell.

BOHOL, Guindulman, *Bur. Sci.* 1257 McGregor, June 26, 1906.

This species is distinguished from *Tarenna maritima* Merr., to which it is manifestly allied, not only by its obtuse leaves, but also by its smaller flowers, the corolla-lobes distinctly shorter than the tube, much smaller anthers, and its glabrous styles.

TARENNA STENANTHA sp. nov.

Arbor parva, partibus junioribus et inflorescentiis cinereo-pubescentibus; foliis oblongis ad oblongo-ellipticis, usque ad 22 cm longis, utrinque leviter et sparse pubescentibus, acuminatis, basi acutis vel decurrento-acuminatis, nervis utrinque circiter 15, papyraceis, in siccitate olivaceis, nitidis; inflorescentiis corymbosis, breviter pedunculatis, multifloris; floribus tenuibus, numerosis, corollae tubo circiter 7 mm longo et 1.5 mm diametro, extus pubescentibus; ovulis circiter 16.

A tree, about 5 m high, the younger parts, inflorescences, and leaves more or less pubescent with short, usually cinereous hairs. Branches brownish, somewhat wrinkled, glabrous, terete or obscurely rounded-angled, about 5 mm in diameter, the internodes 1 cm long or less, the young branchlets nearly as stout, more definitely angled, and rather densely pubescent. Leaves chartaceous, olivaceous, shining, oblong to oblong-elliptic, 15 to 22 cm long, 5 to 7.5 cm wide, subequally narrowed to the acuminate apex and acute to decurrent-acuminate base, both surfaces sparingly pubescent with short, scattered hairs; lateral nerves about 15 on each side of the midrib, prominent, anastomosing; petioles 1 to 1.5 cm long, pubescent; stipules lanceolate, or lanceolate from an ovate base, slenderly long-acuminate, sparingly pubescent, about 1 cm long. Inflorescences terminal, corymbose, rather densely cinereous-pubescent with short hairs, shortly peduncled, about 6 cm long, rather wider than long, many-flowered. Flowers white, slender, their pedicels 2 to 3 mm long, the bracts scattered, linear, about 1 mm long. Calyx ovoid, pubescent, 1.5 mm long, the teeth 5, triangular, acute, 0.3 mm long. Corolla-tube slender, cylindric, pubescent, 7 mm long, 1.5 mm in diameter, the lobes 5, oblong-elliptic, obtuse, 4 mm long and 2 mm wide. Anthers linear, 3.5 mm long. Style and stigma about 17 mm long, exserted, the style pubescent above the glabrous base, the stigma entire or shortly 2-lobed at the apex. Ovary 2-celled; ovules about 8 in each cell.

LUZON, Tayabas Province, Umiray, *Bur. Sci.* 29003 Ramos & Edaño (type), June 6, 1917, in forests along Umiray River at low altitudes.

While the present species does not present any remarkably distinctive vegetative characters, its flowers are unusually small and slender for the genus. It does not appear to be very closely allied to any other described form.

To this species I also refer the following specimens, which were mostly identified by Mr. Elmer with *Stylocoryne macrophylla* Bartl.: LUZON, Bataan Province, Mount Mariveles, *Whitford 1245, For. Bur. 2573, 3030 Borden*: Rizal Province, *For. Bur. 2691 Ahern's collector*: Batangas Province, *Bur. Sci. 22328 Ramos*. MINDORO, *For. Bur. 3726 Merritt*.

TARENNA INCERTA Koord. & Val. Meded. Lands Plantent. 59 (1902) 269; Koord. Exkursionsfl. Java 2 (1912) 259; Koord.-Schum. Syst. Verzeich. Herb. Koord. 1^s (1912) 81; Koord. Atlas Baumarten Java 3 (1915) f. 535.

Tarenna zeylanica Koord. & Val., op. cit. 82, non Gaertn.

Randia wallichii Merr. in Philip. Journ. Sci. 3 (1908) Bot. 266; 5 (1910) Bot. 389; Elm. Leaf. Philip. Bot. 3 (1911) 1004, non Hook. f.

Randia ebracteata Elm. Leaf. Philip. Bot. 4 (1912) 1354.

Tarenna ebracteata Elm. op. cit. 5 (1913) 1898.

Randia fitzalanii Elm. Leaf. Philip. Bot. 1 (1906) 31; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 130, non F. Muell.

This species is of very wide distribution in the Philippines, and is somewhat anomalous in *Tarenna* in the reduction in the number of ovules. In most cases there appear to be but one or two ovules in a cell; but some of the Philippine material, that I cannot otherwise distinguish, presents fruits with as many as five seeds. The usual number of seeds is apparently two in each fruit. I am by no means convinced that *Tarenna incerta* Koord. & Val. is the oldest valid specific name for this species, but feel certain that the Philippine synonyms are properly placed under it. I have a specimen from Burma, *Prazer 79*, that is a close match for *Koorders 39255, 39260, 6770*, from Java, of which I have specimens before me. I refer here the following Philippine specimens:

BATAN ISLANDS, *Batan, For. Bur. 15277 Agudo*. LUZON, Cagayan Province, *For. Bur. 14771 Darling*: Isabela Province, *Bur. Sci. 7992 Ramos*: Abra Province, *Bur. Sci. 7078 Ramos*: Bontoc Subprovince, *Vanoverbergh 3902*: Benguet Subprovince, *For. Bur. 18204 Curran, Merritt, & Zschokke, Elmer 5927, 5994, Merrill Phil. Pl. 773, 1729*: Ilocos Norte Province, *For. Bur. 22987 Adduru*: Ilocos Sur Province, *For. Bur. 5664 Klemme*: Nueva Vizcaya Province, *For. Bur. 18415 Alvarez, Bur. Sci. 11494, 20164 McGregor*: Pangasinan Province, *For. Bur. 19460 Agama, For.*

Bur. 8327 Curran & Merritt, For. Bur. 14395 Villamil, For. Bur. 13494 Medina, Bur. Sci. 4834 Ramos, Merrill Phil. Pl. 2072: Zambales Province, Hallier, Merrill 2988: Bataan Province, For. Bur. 17581 Curran, For. Bur. 1517, 3031 Borden, For. Bur. 2279, 2996 Meyer, For. Bur. 586 Barnes, Whitford 360, 1017, 1057, 1239, Williams 594: Batangas Province, For. Bur. 7635, 7751 Curran & Merritt, Bur. Sci. 24101 Ramos & Deroy: Camarines Province, For. Bur. 10685 Curran: Sorsogon Province, Bur. Sci. 23677 Ramos: Rizal Province, For. Bur. 2095 Ahern's collector, Lohr 6330, Bur. Sci. 13767 Ramos. JOLO, Clemens 9340. PALAWAN, Merrill 9593, Elmer 13114 (type of *Randia ebracteata* Elm.=*Tarenna ebracteata* Elm.).

Considering the wide geographic distribution of the species and its great altitudinal range, from about sea level to an altitude of about 1,400 meters, this species is remarkably uniform.

TARENNA CUMINGIANA (Vid.) Elm. Leaf. Philip. Bot. 5 (1913) 1898.

Webera cumingiana Vid. Phan. Cuming. Philip. (1885) 119, 178.

The type of this species is *Cuming* 865, from Tayabas Province, Luzon. Its alliance is manifestly with *Tarenna mollis* (Wall.) Valetton and *T. winkleri* Valetton. It is represented by the following specimens: LUZON, Sorsogon Province, For. Bur. 10600 Curran, Bur. Sci. 23393 Ramos. LEYTE, Bur. Sci. 15318 Ramos, Wenzel 152, 531, 592, 794, 844. BILIRAN, Bur. Sci. 18950 McGregor. MINDANAO, Surigao Province, Piper 207, 511, Sanchez, Wenzel 1804, For. Bur. 22838 Ponce, Ahern 313, 700: Agusan Subprovince, For. Bur. 24505 Sabino, Elmer 13363.

TARENNA ARBOREA (Elm.) Elm. Leaf. Philip. Bot. 4 (1912) 1359.

Randia arborea Elm. Leaf. Philip. Bot. 3 (1911) 1005.

MINDANAO, Davao District, Elmer 10978, June, 1909.

The alliance of this species is manifestly with the Philippine *Tarrenna stenantha* Merr. and the Javan *T. polycarpa* Koord. & Val.

TARENNA FRAGRANS (Blume) Koord. & Val. in Meded. Lands Plantent. 59 (1902) 88; Elm. Leaf. Philip. Bot. 4 (1912) 1358.

Stylocoryna fragrans Blume Bijdr. (1826) 982.

Webera fragrans Hook. f. Fl. Brit. India 3 (1880) 103.

PALAWAN, Elmer 12768, March, 1911.

The identification of this Philippine specimen with *Tarenna fragrans* Koord. & Val. is merely approximate and, in the absence of flowers, cannot be considered as certain; it differs from typical

Javan material in some particulars, but may be referable to this species.

TARENNA EUCRANTHA (Elm.) comb. nov.

Pavetta eucrantha Elm. Leaf. Philip. Bot. 3 (1911) 1015.

Stylocoryne incerta Elm. op. cit. 1 (1908) 33, non *Tarenna incerta* Koord. & Val.

The type of this is *Elmer 12494*, from Sibuyan. The same species is represented by the following specimens: LEYTE, *Elmer 7054*, distributed as *Pavetta indica* Linn. SAMAR, *Bur. Sci. 24389, 24559 Ramos*. MINDANAO, Zamboanga District, *Ahern 384*; Lanao District, *Mrs. Clemens 435, 584, 652*, and three sheets without number: Agusan Subprovince, *Weber 1006, Elmer 13988*.

This species strongly simulates *Pavetta*, but the flowers are constantly 5-merous, the calyx-teeth are unusually prominent, the ovary cells are 2-ovulate, and the fruits are usually 4-seeded. On account of its ovule and seed characters it cannot be referred to *Pavetta*.

TARENNA PALAWANENSIS (Elm.) comb. nov.

Pavetta palawanensis Elm. Leaf. Philip. Bot. 4 (1912) 1344.

In a previous paper on Philippine Rubiaceae¹⁰ I interpreted this species on the basis of the specimens there cited, giving a description based on the specimens. At that time I had not seen Mr. Elmer's material; the species I described is totally different from that characterized by Mr. Elmer, and is *Pavetta phanero-phlebia* Merr., page 478. The type of *Pavetta palawanensis* Elm. is *Elmer 12940*, and an examination of it shows that the ovary cells are biovulate, and that it is hence a *Tarenna*, not a *Pavetta*. The flowers that I have seen are 5-merous, not 4-merous as described by Elmer. The corolla-tube is less than 4 mm long, and the lobes are about 6 mm in length. The species is very closely allied to *Tarenna eucrantha* (Elm.) Merr., but its flowers are less than one-half as large as are those of the latter species, while its calyx teeth are much less prominent.

TARENNA SCABERULA (Merr.) comb. nov.

Pavetta scaberula Merr. in Philip. Journ. Sci. 10 (1915) Bot. 118.

A reëxamination of this species shows that the ovary cells are biovulate, while the fruits are normally 4-seeded. The

¹⁰ Philip. Journ. Sci. 10 (1915) Bot. 117.

species is also represented by the following specimens, from
LUZON: Laguna Province, San Antonio, *Bur. Sci.* 13524, 20506,
23815 Ramos: Camarines Province, *For. Bur.* 22632 Alvarez.

DOUBTFUL SPECIES

STYLOCORYNA (?) MACROPHYLLA Bartl. ex DC. Prodr. 4 (1830) 377; Miq.
Fl. India Bat. 2 (1856) 206.

This species was based on a specimen collected in Sorsogon Province, Luzon, by Haenke. I have not seen the type, and the description is wholly inadequate; it may be a *Tarenna*, or it may appertain to some entirely different genus. The specimens referred here by local botanists, Elmer¹¹ and Merrill,¹² are *Tarenna stenantha* Merr.

Extra-Philippine Indo-Malayan species of *Tarenna* are as follows:

TARENNA ASIATICA (Linn.) O. Kuntze Rev. Gen. Pl. (1891) 278.

Rondeletia asiatica Linn. Sp. Pl. (1753) 172.

Webera corymbosa Willd. Sp. Pl. 1 (1798) 1224; Hook. f. Fl. Brit.
India 3 (1880) 102, cum. syn.

Tarenna zeylanica Gaertn. Fruct. 1 (1788) 139, t. 28, f. 3.

India and Ceylon.

TARENNA ANGUSTIFOLIA (King) comb. nov.

Stylocoryna angustifolia King in Journ. As. Soc. Bengal 72^{*} (1903)
199.

Perak.

TARENNA ADPRESSA (King) comb. nov.

Stylocoryna adpressa King in Journ. As. Soc. Bengal 72^{*} (1903) 200.

Singapore, Johor, Pahang.

TARENNA MAINGAYI (Hook. f.) comb. nov.

Stylocoryna maingayi King in Journ. As. Soc. Bengal 72^{*} (1903) 200.

Webera maingayi Hook. f. Fl. Brit. India 3 (1880) 103.

Malacca, Perak, Negri Sembilan, Johor.

TARENNA COSTATA (Miq.) comb. nov.

Stylocoryna costata Miq. Fl. Ind. Bat. Suppl. (1862) 218.

Malacca, Selangor, Sumatra.

¹¹ Leaf. Philip. Bot. 1 (1906) 33.

¹² Philip. Journ. Sci. 1 (1906) Suppl. 129.

TARENNA FRAGRANS (Blume) Koord. & Val. Meded. Lands Plantent.
59 (1902) 77.

Stylocoryna fragrans Blume Bijdr. (1826) 982.

Webera fragrans Hook f. Fl. Brit. India 3 (1880) 103.

Malay Peninsula, Banca, Borneo, Java.

TARENNA LAXIFLORA (Blume) Koord. & Val. Meded. Lands Plantent.
59 (1902) 80.

Stylocoryna laxiflora Blume Bijdr. (1826) 983.

Tarenna confusa Val. ex Koord.-Schum. Syst. Verzeich. Herb. Koord.
1^a (1912) 79.

Java.

TARENNA MOLLIS (Wall.) Valetton in Engl. Bot. Jahrb. 44 (1909) 558.

Stylocoryna mollis Wall. Cat. (1848) no. 8454, nomen nudum.

Webera mollis Hook. f. Fl. Brit. India 3 (1880) 104.

Malay Peninsula.

TARENNA SAMBUCINA (A. Gray) Warb. in Engl. Bot. Jahrb. 13 (1891)
432.

Stylocoryna sambucina A. Gray in Proc. Am. Acad. 4 (1859) 309.

New Guinea to Polynesia.

TARENNA NIGRESCENS Warb. in Engl. Bot. Jahrb. 13 (1891) 431.

New Guinea.

TARENNA GLABRA Merr. in Philip. Journ. Sci. 9 (1914) Bot. 149.

Marianne Islands.

TARENNA BORNEENSIS Valetton in Engl. Bot. Jahrb. 44 (1910) 557.
Borneo.

TARENNA WINKLERI Valetton in Engl. Bot. Jahrb. 48 (1912) 112.
Borneo.

TARENNA GIBBSIAE Wernham in Journ. Linn. Soc. Bot. 42 (1914) 93.
Borneo.

TARENNA POLYCARPA (Miq.) Valetton ex Koord.-Schum. Syst. Ver-
zeich. Herb. Koord. 1^a (1912) 82.

Stylocoryna polycarpa Miq. Fl. India. Bat. 2 (1857) 204.

Java.

TARENNA PUMILA (Hook. f.) comb. nov.

Webera pumila Hook. f. Fl. Brit. India 3 (1880) 103.

India.

TARENNA BURUENSIS (Miq.) comb. nov.*Stylocoryna buruensis* Miq. Fl. Ind. Bat. 4 (1868) 129.

Buru.

By no means all of the species described under *Stylocoryna* can be referred to *Tarenna*, but in numerous cases type or authentic material must be studied before the various species can be disposed of, due to imperfect or incomplete original descriptions. A number of forms characterized by Miquel may or may not be referable to *Tarenna*; unfortunately he does not indicate for several species whether the cells are one- or many-ovulate. *Stylocoryna densiflora* Miq. is certainly a *Randia*, probably a synonym of *Randia racemosa* (Cav.) F.-Vill.; *S. albituba* Miq. and *S. lucida* Miq. are apparently forms of *Tarenna fragrans* Koord. & Val. If Miquel included only pluriovulate species under *Stylocoryna*, then perhaps the following species will eventually have to be transferred to *Tarenna*: *S. celebica* Miq., *S. forsteniana* Miq., *S. orophila* Miq.

PAVETTA Linnaeus

In the Philippines various species have been described under *Webera*, some one-ovulate, some several-ovulate. The several-ovulate species I have here placed under *Tarenna*, and after considerable study of the available material, I have concluded that the one-ovulate species are better treated as *Pavetta*; otherwise the only alternative would be the proposal of a new generic name for those forms placed by Hooker f. under the section *Pseudixora* (non *Pseudixora* Miq.). So far as our Philippine forms are concerned, they closely approximate typical *Pavetta*, differing in only trivial and unimportant characters; in aspect, color when dry, stipules, inflorescences, indumentum (when present), and flowers such forms as *Webera pubescens* Vid. and *Webera meyeri* Merr. are *Pavetta*-like in all respects; they differ from typical *Pavetta* in having 5-merous flowers, and the styles slightly grooved and, while prominently exserted, not so greatly elongated. The difference in the number of floral parts is unimportant as in several species of typical *Pavetta* 4- and 5-merous flowers are found on the same specimen. Not having seen specimens of many of the Indian specimens of *Webera* placed by Hooker f. in the section *Pseudixora*, I am not prepared to state that they should be transferred to *Pavetta*, but merely suspect that this is the proper disposition of them; it is certainly the proper disposition of the Philippine species having *Pseudixora* characters.

PAVETTA ELMERI sp. nov.

Frutex circiter 2 m altus, perspicue ciliato-pubescent; foliis obovatis, membranaceis, usque ad 12 cm longis, obtusis ad obtuse acuminatis, basi acutis, nervis utrinque circiter 12, distinctis; inflorescentiis brevissime pedunculatis, confertis, multifloris, 3 ad 4 cm longis, dense ciliato-villosis; floribus 4-meris, corollae tubo 5 ad 6 mm longo.

A shrub, about 2 m high, the leaves and inflorescences conspicuously ciliate-pubescent. Branches terete, smooth, pale, shining, the very young growing parts densely ciliate with pale hairs. Leaves (immature) membranaceous, obovate, 9 to 12 cm long, 5 to 7 cm wide, brown or black when dry, the apex obtuse to obtusely acuminate, the base acute, both surfaces prominently ciliate-pubescent especially on the midrib and lateral nerves; lateral nerves about 12 on each side of the midrib, prominent; petioles densely pubescent, 1 cm long or less; stipules broadly ovate, acuminate, about 5 mm long, pubescent. Inflorescences densely many-flowered, 3 to 4 cm long, short-peduncled, the axis, branches, pedicels, and calyces densely and uniformly ciliate-pubescent with cinereous hairs. Calyx 2 to 2.5 mm long, the teeth 4, oblong, acute, nearly 1 mm long. Corolla-tube 5 to 6 mm long, glabrous externally, inside somewhat pubescent, the lobes 4, oblong, about 4 mm long. Anthers 4 mm long. Ovary 2-celled, cells 1-ovulate; style and stigma glabrous, at least 10 mm long.

LUZON, Benguet Subprovince, Twin Peaks, *Elmer 6394*, May 31, 1914.

This species is well characterized by its rather dense and characteristic ciliate indumentum; its obovate leaves; its densely crowded, relatively short flowers; and its glabrous styles. It belongs in the group with *Pavetta indica* Linn., but does not appear to be very closely allied to that species.

PAVETTA MULTINERVIA sp. nov.

Frutex 3 ad 5 m altus, inflorescentiis parcissime puberulis exceptis glaber; ramulis compressis vel angulatis; foliis lanceolatis ad oblongo-lanceolatis, membranaceis vel chartaceis, usque ad 25 cm longis, in siccitate nigris, nitidis, utrinque acuminatis, nervis utrinque circiter 15, perspicuis; inflorescentiis pedunculatis, trifidis 11 ad 13 cm longis; floribus 5-meris, calycis tubo 6 mm longo, lobis oblongo-oblancheolatis, circiter 12 mm longis.

A shrub, 3 to 5 m high, entirely glabrous except the sparingly puberulent inflorescence. Branchlets brown or black when dry,

compressed or angled. Leaves membranaceous to chartaceous, uniformly black and shining on both surfaces when dry, lanceolate to oblong-lanceolate, 18 to 25 cm long, 5 to 7 cm wide, subequally narrowed to the acuminate base and apex; lateral nerves about 15 on each side of the midrib, prominent, slightly curved, anastomosing, the reticulations lax; petioles 2 to 3 cm long; stipules broadly ovate, abruptly acuminate, about 5 mm long. Panicles terminal, peduncled, black when dry, sparingly puberulent, 11 to 13 cm long, 3-branched, the flowers somewhat crowded toward the ends of the branches. Flowers white, black when dry, 5-merous, their pedicels 6 mm long or less. Calyx slightly puberulent, urceolate, about 2.5 mm long, truncate or very obscurely 5-toothed. Corolla-tube glabrous, not even bearded at the throat, about 6 mm long, the lobes oblong-oblancoolate, obtuse, about 12 mm long and 2.5 mm wide. Anthers 10 mm long. Ovary 2-celled, cells 1-ovulate; style and stigma about 2.2 mm long, the former slightly pubescent in the median part.

MINDANAO, Zamboanga District, Port Banga, *For. Bur. 9013 Whitford & Hutchinson*, November 29, 1907, on forested ridges, altitude about 30 meters.

This species is strongly characterized by its elongated, many-nerved leaves; its peduncled, trifid inflorescences; its 5-merous flowers; and short corolla-tube which is not bearded at the throat, the lobes being twice as long as the tube. The plant is entirely glabrous except the sparingly puberulent inflorescence.

PAVETTA WILLIAMSII sp. nov.

Arbor circiter 4.5 m alta, molliter pubescens; foliis in siccitate nigris, nitidis, membranaceis vel chartaceis, usque ad 25 cm longis, oblongo-ellipticis ad oblongo-obovatis, acuminatis, basi acutis, nervis utrinque circiter 7, perspicuis; inflorescentiis corymbosis, laxis, multifloris, usque ad 10 cm longis et 15 cm latis; floribus 4-meris, corollae tubo circiter 11 mm longo, lobis oblongis, obtusis, 8 mm longis.

A small tree, about 4.5 m high, the branchlets, lower surface of the leaves, and inflorescences softly pubescent, the leaves, flowers, and inflorescences black when dry. Branches terete, smooth, brownish or grayish, glabrous. Leaves oblong-elliptic to oblong-obovate, membranaceous to chartaceous, 15 to 25 cm long, 6 to 9 cm wide, rather prominently acuminate, base acute, black and shining when dry, the upper surface glabrous, or when young sparingly puberulent, the lower surface softly pubescent with

spreading, pale or dirty-brown hairs, especially on the midrib and nerves; lateral nerves about 7 on each side of the midrib, prominent, curved, ascending, anastomosing, the reticulations very lax; petioles pubescent, 2 to 3 cm long; stipules oblong-ovate, acute or somewhat acuminate, pubescent, about 6 mm long. Panicles ample, sessile or shortly peduncled, corymbose, up to 10 cm long and 15 cm wide, black when dry, softly pubescent. Flowers white, 4-merous, black when dry, the pedicels slender, up to 1 cm in length. Calyx 2.5 to 3 mm long, densely pubescent, somewhat urceolate, the teeth 4, acute, triangular, 0.5 mm long. Corolla-tube glabrous, 11 mm long, the lobes 4, oblong, obtuse to subacute, about 8 mm long and 3 mm wide. Ovary 2-celled, cells 1-ovulate; style and stigma slender, 3.5 cm long, glabrous.

MINDANAO, Davao District, Mount Apo, *Williams 2631* (type), April 5, 1905, *Copeland 1249*, April, 1904, altitude about 900 meters, known to the Bagobos as *sikarig*.

This species falls in the group with *Pavetta indica* Linn., but is distinguished by its indumentum, its much larger leaves, and ample, lax inflorescences.

PAVETTA SUBFERRUGINEA sp. nov.

Frutex circiter 3 m altus, ramulis junioribus, subtus foliis ad costa nervisque et inflorescentiis perspicue subferrugineo-pubescentibus; foliis chartaceis, olivaceis, oblongis ad oblongo-lanceolatis vel oblongo-ellipticis, usque ad 16 cm longis, tenuiter acuminatis, basi cuneatis, nervis utrinque circiter 9, supra plus minusve impressis, subtus perspicuis; inflorescentiis laxis, sessilibus vel subsessilibus; floribus 4-meris, corollae tubo 1.8 cm longo, utrinque glabro, fauce haud barbato, lobis subellipticis, 6 mm longis.

A shrub, about 3 m high, the younger parts, lower surface of the leaves, and inflorescences conspicuously and softly subferruginous-pubescent with spreading hairs. Branches pale, smooth, glabrous, terete. Leaves chartaceous, olivaceous and shining when dry, oblong to oblong-lanceolate or oblong-elliptic, 10 to 16 cm long, 3 to 5 cm wide, the apex rather slenderly acuminate, base cuneate, the upper surface glabrous or somewhat harsh from the few, short, stiff hairs, the midrib pubescent, the lower surface rather densely subferruginous-pubescent on the midrib and lateral nerves, with scattered hairs on the epidermis; lateral nerves about 9 on each side of the midrib, somewhat impressed on the upper surface, prominent beneath, anastomosing, the reticulations lax, prominent; petioles pubescent, 1 to 1.8 cm long;

stipules broadly ovate, acuminate, pubescent, about 6 mm long. Inflorescences sessile or subsessile, lax, the axis and branches 3 cm long or less, subferruginous-pubescent, the whole inflorescence including the slender styles about 12 cm in diameter. Flowers white, 4-merous. Calyx pubescent, 3 mm long, ovoid, the teeth 4, ovate, acute, 0.8 mm long. Corolla-tube slender, glabrous on both surfaces, about 18 mm long, the throat not bearded, the lobes 4, subelliptic, obtuse, 6 mm long, 3.5 mm wide. Anthers 6 mm long, spirally twisted. Ovary 2-celled, cells 1-ovulate; style and stigma very slender, glabrous, 4.5 cm long.

PALAWAN (Paragua), Separation Point, Merrill 831, February 18, 1903, in forests at low altitudes.

This species resembles *Pavetta indica* Linn., but differs in so many characters that it can scarcely be treated as a form or variety of that species. Notable characters are its subferruginous indumentum, longer flowers, its corolla glabrous on both surfaces and not bearded at the throat, and its greatly elongated styles.

PAVETTA INDICA Linn. Sp. Pl. (1753) 110.

Pavetta barnesii Elm. Leaf. Philip. Bot. 1 (1906) 27; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 132.

This species is represented by about fifty different collections from all parts of the Philippines. Now that so much material is available, and further that we have abundant material from India, China, and Malasia for comparison, I fail to see how *Pavetta barnesii* Elm. can be distinguished from the typical form of *Pavetta indica* Linn. I interpret the type of *Pavetta indica* Linn. as the Ceylon plant, Fl. Zeyl. No. 56, and an excellent description of this typical form is given by Trimen.¹⁸ The type of *Pavetta barnesii* Elm. closely matches *Thwaites 1663* from Ceylon.

PAVETTA PHANEROPHLEBIA Merr. nom. nov.

Pavetta palawanensis Merr., in Philip. Journ. Sci. 10 (1915) Bot. 117, cum. descr., non Elm.

As noted under *Tarenna*, to which *Pavetta palawanensis* Elm. pertains, my interpretation of *Pavetta palawanensis* Elm. was based on Mr. Elmer's description which, as to the flowers, is incomplete and somewhat erroneous. An examination of his type shows that the ovary cells of his species are biovulate, so

¹⁸ Fl. Ceyl. 2 (1894) 349.

that *Pavetta palawanensis* Elm. must be removed from this genus; see *Tarennia palawanensis* Merr., page 471. The description of *Pavetta palawanensis* Merr. (non Elm.) cited above is typified by Bur. Sci. 326 Bermejós, this specimen thus becoming the type of *Pavetta phanerophlebia* Merr.

PAVETTA LUZONIENSIS (Vid.) comb. nov.

Webera luzoniensis Vid. Phan. Cuming. Philip. (1885) 119, 179, Rev. Pl. Vasc. Filip. (1886) 152; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 133; Elm. Leaf. Philip. Bot. 1 (1906) 40.

The type of this is *Cuming 1323* from Cagayan Province, Luzon. It is one of the forms having 5-merous flowers, falling in the group that some botanists have placed in *Webera*. While the specimens cited below present some variations from the type, they are in most respects fairly uniform and I believe all represent Vidal's species:

LUZON, Cagayan Province, *Adduru 66, 120, 192, 264*: Apayao Subprovince, *Bur. Sci. 28146 Fénix*: Pangasinan Province, *Alberto 29*: Nueva Vizcaya Province, *Merrill 142*: Bataan Province, *Merrill 1488, 2505, 2524, 3260, Elmer 6661, Leiberg 6160, For. Bur. 2188 Meyer*: Laguna Province, *Gates & Quisumbing 7536, Elmer 8316, Baker 3291*: Batangas Province, *For. Bur. 21527 Tamesis*: Rizal Province, *Bur. Sci. 6776 Robinson, Guerrero 27, Bur. Sci. 10894 Ramos*. PALAWAN, *Bur. Sci. 701 Foxworthy*.

PAVETTA MEYERI (Elm.) Elm. Leaf. Philip. Bot. 3 (1911) 1015.

Ixora meyeri Elm. Leaf. Philip. Bot. 1 (1908) 68.

Webera meyeri Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 133.

Tarennia meyeri Elm. Leaf. Philip. Bot. 5 (1913) 1898.

This species is still known only from a single collection, *For. Bur. 2764 Meyer*, from Mount Mariveles, Bataan Province, Luzon. The flowers are not mature, so that the styles are not exerted as is the case with *Pavetta* in full anthesis. The specimen is, however, a typical *Pavetta*; it cannot possibly be referred to *Tarennia* as the cells are but 1-ovulate.

PAVETTA PUBESCENS (Bartl.) comb. nov.

Stylocoryna pubescens Bartl. ex DC Prodr. 4 (1830) 377.

Webera sp. Vid. Phan. Cuming. Philip. (1885) 42.

I have seen two specimens of Haenke's collection on which this species was based, one in the Prague Herbarium, in flower, and one in the Herbarium of the Missouri Botanical Garden, in bud. Haenke's specimen was unquestionably from northern Luzon, as it is closely matched by several specimens from this

region and is not known from any other locality. *Cuming 1236*, from Ilocos Norte Province, is an excellent match for the type. *Bur. Sci. 7626, 7667 Ramos and For. Bur. 15222 Merritt & Darling*, from the same province, also represent the same species. The flowers are typical of *Pavetta*, differing from the majority of the species in the genus in being 5-merous rather than 4-merous; the fruits are 2-celled, each cell with a single cupped seed.

TIMONIUS de Candolle

TIMONIUS AURICULATUS sp. nov.

Species *T. hirsuto* affinis, differt foliis basi perspicue auriculato-cordatis. Frutex vel arbor parva, ramulis et foliis et inflorescentiis perspicue hirsutis; foliis chartaceis ad coriaceis, in siccitate brunneis, oblongo-obovatis, 9 ad 20 cm longis, apice rotundatis ad late acutis, deorsum angustatis, basi perspicue auriculato-cordatis, nervis utrinque circiter 9; inflorescentiis pedunculatis, dichotomis, 3 ad 5 cm longis, ramis primariis 1 ad 2 cm longis; floribus paucis, sessilibus, calycis truncatis, perspicue longe hirsutis.

A shrub or small tree, the branchlets, leaves, and inflorescences prominently hirsute with long, spreading, brownish hairs, the branches glabrous, terete. Leaves chartaceous to coriaceous, brown when dry, oblong-obovate, 9 to 20 cm long, 3.5 to 9.5 cm wide, the apex rounded to broadly acute, the base narrowed and distinctly auriculate-cordate, 8 to 40 mm across the basal lobes; lateral nerves about 9 on each side of the midrib, rather slender, distinct, curved-ascending, the reticulations evident; petioles 4 to 10 mm long, hirsute; stipules deciduous. Inflorescences in the uppermost axils, peduncled, 3 to 5 cm long, dichotomous, the peduncles up to 3 cm in length, the two branches 1 to 2 cm in length. Flowers usually 4 to 6 on each branch, sessile, the calyces 1.5 to 2 mm in length, truncate, densely hirsute with long, spreading, pale brownish hairs up to 4 mm in length. Corolla not seen.

DINAGAT, *Bur. Sci. 35190* (type), *35212 Ramos & Pascasio*, May, 1919. In forests at low altitudes.

This species is manifestly closely allied to *Timonius hirsutus* (Elm.) comb. nov. (*Greenia hirsuta* Elm., *Timonius trichophorus* Merr.), from which it is at once distinguished by the auriculate-cordate leaf bases. The indumentum on the present species is very characteristic, consisting of long, spreading, pale brownish hairs, these being rather densely disposed on the branchlets and

inflorescences, scattered on both surfaces of the leaves and here more abundant on the midrib and nerves, especially on the lower surface. In age the upper surface of the leaf becomes glabrous or nearly so. In the type specimen the leaf base across the basal auricles is 1 cm in width or less; in the second specimen cited, which is sterile, the leaf bases are from 3 to 5 cm in width.

UROPHYLLUM Wallich

UROPHYLLUM CAUDATUM sp. nov.

Frutex glaber; foliis firmiter chartaceis, oblongis ad oblongo-lanceolatis, 6 ad 8 cm longis, basi acutis, apice tenuiter caudato-acuminatis, nervis utrinque plerumque 5, perspicuis, curvatis; fructibus axillaribus solitariis vel binis, globosis, 5 mm diametro; pedicellis 7 ad 10 mm longis.

A glabrous shrub, the branchlets slender. Leaves firmly chartaceous, oblong to oblong-lanceolate, 6 to 8 cm long, 2 to 3 cm wide, base acute, apex slenderly caudate-acuminate; lateral nerves usually 5 on each side of the midrib, prominently curved, distinct, anastomosing, the reticulations rather close, evident; petioles 1 to 1.5 cm long, stipules narrowly oblong, blunt, about 5 mm long. Fruits axillary, solitary or in pairs, globose, about 5 mm in diameter, crowned by the obscurely toothed calyx limb; pedicels 7 to 10 mm long, usually with a pair of small bracteoles at the base.

LUZON, Ilocos Norte Province, Mount Palimlim, *Bur. Sci.* 33348 Ramos, August 20, 1918, on forested slopes, altitude 900 meters.

This species is apparently most closely allied to *Urophyllum luzoniense*, from which it is easily distinguished by its thinner, caudate-acuminate, much fewer-nerved leaves.

UROPHYLLUM AFFINE sp. nov.

Frutex perspicue ciliato-villosis; foliis chartaceis, oblongis ad oblongo-lanceolatis, 13 ad 17 cm longis, tenuiter subcaudato-acuminatis, nervis utrinque circiter 12, perspicuis, utrinque plus minusve villosis; floribus ♂ solitariis, ♂ fasciculatis, breviter pedicellatis, dense villosis, calycis 4-dentatis, corollae lobis 6, anguste oblongis, 3 mm longis, extus villosis.

A polygamous shrub, the branches, branchlets, petioles, stipules, flowers and the leaves on both surfaces, especially on the midrib and nerves, ciliate-villous. Leaves chartaceous, oblong to oblong-lanceolate, 13 to 17 cm long, 4 to 6.5 cm wide, usually grayish when dry, base acute to rounded, apex slenderly subcaudate-acuminate, the upper surface and often the margins

sparingly ciliate-villous, the lower surface with more numerous and similar hairs on the midrib, nerves, and primary reticulations; lateral nerves about 12 on each side of the midrib, curved, anastomosing, prominent on the lower surface as are the primary reticulations; petioles 7 to 18 mm long, very densely ciliate-villous; stipules narrowly lanceolate, densely villous, about 2 cm long. Perfect flowers solitary, their pedicels 2 mm long or less, the subtending bracts narrowly lanceolate, densely villous, 2 to 3 mm long. Calyx densely villous, obscurely 4-toothed, about 4 to 5 mm long. Corolla-tube glabrous, 2 mm long, the lobes 6, narrowly oblong, villous externally, about 3 mm long, the throat densely bearded. Staminate flowers in axillary fascicles, densely villous, their pedicels 2 to 3 mm long, calyx about 5 mm in diameter, shallowly cup-shaped, villous, 4-toothed. Corolla-tube 2 mm long, the lobes oblong-lanceolate, similar to those of the perfect flowers. Stamens 6.

LUZON, Tayabas Province, Mount Binuang, *Bur. Sci.* 28482, 28716 (type) Ramos & Edaño, May, 1917, on forested slopes apparently at low altitudes; the same species is represented by *Bur. Sci.* 29917 Ramos & Edaño, from Mount Tulaog which is not far from Mount Binuang.

All three specimens cited above were tentatively identified as *Urophyllum lucbanense* Elm. to which the present species is manifestly allied but from which it is easily distinguished by its larger leaves, its much denser indumentum, longer petioles, and very densely villous flowers.

UROPHYLLUM PANAYENSE sp. nov.

Frutex, ramis glabris, ramulis floribusque leviter pubescens; foliis chartaceis, oblongis ad oblongo-ellipticis, 10 ad 16 cm longis, basi acutis, apice perspicue acuminatis, nervis utrinque circiter 15, perspicuis; floribus fasciculatis et in cymis brevibus dispositis, corollae lobis 6, oblongis, glabris, calycis leviter pubescentibus.

A shrub, the growing parts of the branchlets and the flowers more or less pubescent. Branches terete, glabrous. Leaves oblong to oblong-elliptic, firmly chartaceous, 10 to 16 cm long, 3.5 to 6 cm wide, grayish when dry, the younger ones slightly appressed-pubescent on the midrib and nerves beneath, soon becoming glabrous, subequally narrowed to the acute base and rather prominently acuminate apex, the acumen blunt; lateral nerves about 15 on each side of the midrib, prominent on the

lower surface, curved, anastomosing, the reticulations distinct; petioles 1.5 to 2 cm long; stipules oblong to oblong-lanceolate, about 1.5 cm long, more or less appressed-hirsute on the back. Flowers sometimes in axillary fascicles, sometimes in short-peduncled, few-flowered, bracteate cymes, both types occurring on the same branches; bracts when present oblong to lanceolate, 6 to 12 mm long, more or less hirsute; pedicels somewhat hirsute, 3 to 5 mm long. Calyx ovoid, somewhat hirsute, obscurely toothed, about 4 mm long. Corolla-tube about 3 mm long, the lobes 6, oblong, recurved, glabrous, 3.5 mm long, the throat bearded, stamens 6, the anthers about 1 mm long.

PANAY, Capiz Province, Jamindan, *Bur. Sci.* 31421 Ramos & Edaña (type), May 22, 1918, in forests along small streams. Nos. 30819 and 31105 of the same collectors from the same locality apparently represent the same species, although the last two differ in a few details from the type.

UROPHYLLUM QUADRIBRACTEOLATUM sp. nov.

Frutex 2 ad 3 m altus, molliter villosis; foliis chartaceis vel membranaceis, oblongis ad oblongo-lanceolatis, 10 ad 15 cm longis, apice subcaudato-acuminatis, nervis utrinque 9 ad 12, perspicuis, supra, costa exceptis, glabra; floribus solitariis, pedicellatis 1 ad 2 mm longis, bracteolis 4 verticillatis lineari-oblongis instructis, calycis dense villosis, circiter 6 mm longis, corollae lobis 6, extus villosis.

An erect shrub, 2 to 3 m high, the branches, branchlets, flowers and leaves on the lower surface softly villous, the internodes 5 to 10 cm long. Leaves chartaceous or membranaceous, oblong to oblong-lanceolate, 10 to 15 cm long, 3 to 4.5 cm wide, the upper surface glabrous except for the slightly pubescent midrib, grayish when dry, base acute, apex slenderly subcaudate-acuminate; lateral nerves 9 to 12 on each side of the midrib, somewhat ascending, curved, not anastomosing except toward the apex, prominent on the lower surface, the reticulations distinct; petioles 7 to 12 mm long, rather densely pubescent; stipules linear-oblong, pubescent, about 1 cm long. Flowers axillary, solitary, their pedicels densely pubescent, 1 to 2 mm long, bearing a whorl of four, linear-oblong, pubescent, 4 to 5 mm long bracteoles, the pedicel extended about 1 mm above the bracteole. Calyx 6 mm long, densely villous, 4-lobed, the lobes ovoid, obtuse, 2.5 mm long. Corolla-tube 0.4 mm long, the lobes 6, lanceolate, acuminate, villous, about 2.5 mm long, throat bearded. Stamens 6. Style 2 mm long, 6-cleft.

LUZON, Apayao Subprovince, Ngagan, *Bur. Sci.* 28161 *Fénix*, May 8, 1917, in damp forests.

This species was originally identified as *Urophyllum lucbanense* Elm., but it is not closely allied to that species. It is easily distinguished by its solitary pedicellate flowers, the pedicels being supplied with a whorl of four narrow, elongated, free bracteoles.

WILLIAMSIAM Merril

WILLIAMSIAM PANAYENSIS sp. nov.

Frutex erectus plus minusve molliter cinereo-villosis; foliis membranaceis ad chartaceis, oblongis, usque ad 24 cm longis, perspicue acuminatis, supra glabris vel subglabris, subtus ad costa nervisque molliter villosis, nervis utrinque 16 ad 20, perspicuis; floribus ♂ solitariis, sessilibus, ♂ fasciculatis, bracteolis involucrentibus dense villosis, exterioribus 4-lobatis, 3 ad 4 mm diametro, interioribus profunde 4-lobatis, vel segmentis liberis, oblongo-ovatis, 3.5 ad 5 mm longis; calycis dense villosis, 4-lobatis; corollae lobis 6 vel 7, oblongis, 4 ad 4.5 mm longis.

An erect shrub, the branches, flowers, petioles, and leaves on the midrib and nerves beneath softly cinereous-villous. Leaves membranaceous to chartaceous, oblong, 16 to 24 cm long, 6 to 9 cm wide, grayish-olivaceous when dry, the upper surface ultimately glabrous, the lower surface softly villous on the midrib and nerves, base acute to obtuse, apex rather prominently acuminate; lateral nerves 16 to 20 on each side of the midrib, prominent on the lower surface, curved, anastomosing, the reticulations distinct; petioles densely villous, 1.5 to 2.5 cm long; stipules narrowly oblong, densely villous, about 2 cm long. Flowers polygamous, the perfect ones usually solitary, sessile or subsessile, the staminate ones in few-flowered fascicles. Perfect flowers subtended by two series of densely villous bracts, the outer series forming a deeply lobed cup, 3 to 4 mm in diameter, the inner series larger, cleft nearly or quite to the base into four, oblong-ovate, acuminate lobes, 3.5 to 5 mm long. Calyx densely villous, the lobes 4, ovate to oblong-ovate, somewhat acuminate, 4 mm long. Corolla-tube 3 mm long, the lobes 6 or 7, white, oblong, acuminate, 4 to 4.5 mm long, densely villous externally, the throat densely bearded, the stamens 6 or 7. Staminate flowers smaller than the perfect ones but otherwise similar. Fruits globose, about 1 cm in diameter, rather densely villous.

PANAY, Capiz Province, Jamindan, *Bur. Sci.* 31043 (type),

31310, 31315 Ramos & Edaño, April and May, 1918, in damp forests along small streams.

This species is readily distinguished from the others described in the genus by its indumentum and especially by its densely villous bracteoles and flowers. The bracteoles are deeply 4-cleft, the inner series with free or nearly free lobes. It has much the appearance of certain forms of *Urophyllum* but has the involucriform double series of bracteoles characteristic of *Williamsia*.

WILLIAMSLONGISTIPULA sp. nov.

Frutex erectus, plus minusve ciliato-villosus; foliis membranaceis, oblongo-lanceolatis, usque ad 27 cm longis, supra glabris, tenuiter caudato-acuminatis, nervis utrinque circiter 17, perspicuis, subtus ciliato-villosis; floribus axillaribus, fasciculatis, villosis, bracteolis involucriformibus membranaceis, villosis, exterioribus 3 mm diametro, profunde 4-lobatis, interioribus subquadratis, 4 ad 5 mm latis, angulis leviter acuminatis; fructibus ovoideis, villosis, circiter 8 mm longis.

A shrub, 2 to 3 m high, the branchlets, stipules, flowers and leaves on the midrib and nerves beneath ciliate-villous, the older branches glabrous or nearly so, the internodes 3 to 6 cm long. Leaves membranaceous, oblong-lanceolate, pale when dry, 23 to 27 cm long, 6 to 7.5 cm wide, the upper surface entirely glabrous, base acute, apex slenderly caudate-acuminate; lateral nerves about 17 on each side of the midrib, prominent on the lower surface, curved, ascending, arched-anastomosing close to the margin, the reticulations rather lax, distinct, these sparingly ciliate-villous as are the nerves and midrib; petioles 1 to 1.5 cm long; stipules narrowly lanceolate, 3 to 4 cm long. Flowers axillary, fascicled, villous, the basal, cuplike bracteoles membranaceous, villous, the outer one about 3 mm in diameter, deeply 4-lobed, the lobes lanceolate-acuminate, the inner one nearly square, 4 to 5 mm wide, the corners acuminate. Fruits ovoid, about 6-celled, villous, about 8 mm long, sessile or nearly so, the persistent calyx lobes 4, broadly ovate, rounded or obtuse, about 3 mm long.

MINDANAO, Butuan Subprovince, Agusan River at Waloe, Merrill 7287, October 2, 1910, in damp forests, altitude about 50 meters.

This species is most closely allied to *Williamsia panayensis* Merr., from which it is distinguished by its longer stipules, its caudate-acuminate leaves, and by its entirely different involucriform bracts.

LOW-SUN PHENOMENA IN LUZON

II. ZENITH OBSERVATIONS OF DAWN, BAGUIO, 1920

By WILLARD J. FISHER

Assistant Professor of Physics, University of the Philippines

In a previous paper ¹ I have made an attempt to determine a lower limit to the extent of the atmosphere by noting at a known geographical position the time when the zenithal region becomes perceptibly blue. It was there mentioned that this blue coloration is preceded by a pale light spreading upward from the lower parts of the Zodiacal Light, and that the artificial illumination of the lower hazy air by the light of Manila prevents there any consistent observations of this "pale dawn."

April 17-18, 1919, from the summit of Mount Santo Tomas, elevation 2,258 meters, near Baguio, Benguet, I observed that faint stars were visible at very small angular altitudes; and that the haze of the lower air extended only to a height of about 1,500 meters, because a mountain 1,590 meters high projected slightly above the haze; so it was evident that from such a station in the Mountain Province the zenith passage of the pale dawn might be observed with fair accuracy. During a visit to Baguio, April 10 to May 2, 1920, made for this and related purposes, I was unfortunately prevented from visiting Santo Tomas; but from a station on the Outlook Drive, called Outlook Point on Bach's Map of the City of Baguio, I made six morning observations of this phenomenon—nearly all that it was possible to make between the new moon of April 19 and the full moon of May 3, for strato-cumulus and cirro-stratus clouds spoiled some mornings.

In the previous paper it was shown that the presence of the Zodiacal Light near the zenith was a hindrance to the prompt perception of the blue color at the zenith, while the same location of the Milky Way had less influence. But I found that the brilliancy of the Galaxy in the zenith sky of Outlook Point quite outshone the pale silvery light whose appearance I was to ob-

¹ Fisher, W. J., Philip. Journ. Sci. (1920) 151.

serve; fortunately, the Galaxy stretched across the heavens in a plane oblique to the direction of the sun, so that after three mornings I was able to estimate the moment of zenith passage with some accuracy and consistency.

The watch, etc., were the same as used previously. The watch was checked twice on most days of my stay in Baguio; always by the telegraph time signals at 11 o'clock in the morning when they did not fail, which they sometimes did; again about 6 in the afternoon by the pendulum clock of the Meteorological Observatory on Mount Mirador; and a proper allowance was made for the temperature changes shown by the two comparisons to have a considerable effect on the watch.

Measurement on the map showed the station at Outlook Point to be nearly in the same latitude as Mount Mirador, and about 2 minutes 8 seconds eastward; so I took for its coördinates, Latitude North $16^{\circ} 25.0'$, Longitude East 8 hours 2 minutes 32 seconds; its height is not essential, but is marked as 1,464 meters, or very nearly at the upper limit of the lower haze. That this limit was still about 1,500 meters was shown repeatedly by sighting on the setting sun with a Locke hand level supported on a camera tripod at Mount Mirador, where the station barometer cistern is stated by the observers to be 1,512.5 meters high. The sun, which had been very brilliant, plunged quite suddenly into the haze just as it passed the sighting line of the level.

Rejecting the three practice observations, the table shows the results, computed with four-place logarithms, and retaining tenths of minutes, though these are not significant.

Date, 1920.	Hour east 120° .	Sun's altitude.	Sidereal time.
	<i>H. m. s.</i>	$^{\circ}$ $'$	<i>H. m. s.</i>
April 23	4 33 9	-15 43.1	18 38 4
24	4 31 43	-15 51.6	18 40 38
25	4 31 20	-15 48.0	18 44 7
Mean		-15 47.6	

Lower limit to atmospheric extent, $H > 211.0$ kilometers; which may be compared with 181.6 kilometers, the largest value deducible from the data of the previous paper, and with 70 kilometers, deduced by others from horizon observations of dawn and twilight.

PHILIPPINE TERMITES COLLECTED BY R. C. MCGREGOR,
WITH DESCRIPTIONS OF ONE NEW GENUS
AND NINE NEW SPECIES

By MASAMITSU OSHIMA

Of the Government Institute of Science, Formosa

FOUR PLATES

During 1917 and 1918 Mr. R. C. McGregor, of the Bureau of Science, Manila, made extensive collections of termites in Luzon and Panay in order to get some further knowledge of the Philippine termite fauna. Among the species obtained are the following nine which seem to be new to science:

- Calotermes* (*Neotermes*) *lagunensis*.
- Rhinotermes* (*Schedorhinotermes*) *bidentatus*.
- Termitogetonella* g. nov. *tibiaoensis*.
- Odontotermes* *mediodentatus*.
- Eutermes* (*Eutermes*) *castaneus*.
- Eutermes* (*Eutermes*) *las-piñasensis*.
- Eutermes* (*Rotunditermes*) *culasiensis*.
- Eutermes* (*Grallatotermes*) *panayensis*.
- Capritermes* *paetensis*.

It is a striking fact that the majority of the species in the Panay collection are quite different from those hitherto known from Luzon. Therefore, it is reasonable to suppose that the Philippine termite fauna may be extraordinarily rich, since the larger part of the Islands is unexplored.

Coptotermes formosanus, the commonest termite in Formosa and in South China, is here recorded from the Philippine Islands for the first time. This species is a formidable pest to wooden structures and wood products.

Here I express my hearty thanks to Mr. McGregor, by whose courtesy I was able to examine the collections.

PROTERMITIDÆ

CALOTERMITINÆ

Genus **CALOTERMES** Hagen

Calotermes (Neotermes) malatensis Oshima. Plate 1, fig. 1.

Calotermes (Neotermes) malatensis OSHIMA, Philip. Journ. Sci. § D
12 (1917) 221 (Luzon, Manila, Malate).

LUZON, Manila, Malate, October 10, 1917.

Remarks.—A single specimen (imago).

Calotermes (Neotermes) lagunensis sp. nov. Plate 1, fig. 2; Plate 3,
figs. 1 and 2; Plate 4, fig. 1.

Imago.—Unknown.

Soldier.—Head reddish brown; anteclypeus yellowish white; labrum yellow; antennæ amber-colored; mandible black-brown, proximal part becoming paler; pronotum yellowish; abdomen milk-white. Head sparingly pilose; sternites and abdominal tergites roughly covered with spiny hairs.

Head cylindrical, sides nearly straight and parallel, posterior border rounded; forehead gradually inclined anteriorly; antennæ 15-jointed, first joint cylindrical, exceedingly large, second joint shorter than third, fourth joint as long as second, other joints ovoid, subequal in length; no rudimental eyes; fontanelle not present; anteclypeus trapezoidal, nearly one-fourth as long as broad; postclypeus not separated from forehead, with a series of spiny hairs along its anterior border; labrum tongue-shaped, slightly longer than broad, with a small number of long hairs at the tip; mandibles rather stout, with piercing incurved tip; right mandible with two triangular teeth, subequal in size, left mandible with six teeth, apical two subequal, sharply pointed, third exceedingly low, fourth molarlike, its cutting surface concave, fifth broad and low, the last one triangular, sharply pointed; pronotum as broad as head, subreniform, anterior border nearly straight, posterior border obscurely bilobed, sides converging posteriorly; mesonotum much narrower than pronotum; metanotum a little larger than mesonotum.

	mm.
Length of body	9.00–11.00
Length of head, with mandibles	3.93– 4.53
Length of head, without mandibles	2.67– 3.20
Width of head	2.13– 2.40
Width of pronotum	2.13– 2.40
Length of pronotum	1.00– 1.13

Worker.—Head yellowish; thorax and abdomen milk-white. Head and sternites sparingly pilose; abdominal tergites with two transverse series of spiny hairs.

Head spherical; anterolateral corners of postclypeus brown; antennæ 15-jointed, second joint nearly as long as third, fourth joint ring-shaped, about half as long as third, fifth joint a little longer than fourth; pronotum nearly as broad as head, quadrilateral, anterior and posterior borders nearly straight, lateral borders slightly convex, not converging posteriorly, posterolateral corners broadly rounded; abdomen elongate.

	mm.
Length of body	10.00
Width of head	2.00
Width of pronotum	2.06

LUZON, Laguna Province, Paete, March 7, 1917; inhabiting an old palm stub.

COPTOTERMITINÆ

Genus *COPTOTERMES* Silvestri

Coptotermes travians (Haviland).

Termes travians HAVILAND, Journ. Linn. Soc. London 26 (1898) 391, pl. 23, figs. 19-22 (Singapore and Sarawak).

PANAY, Antique Province, Culasi, July 1, 1918; inhabiting a house-post and clothing. LUZON, Manila, Malate, May 20, 1917; from the inside of posts and floors of Mr. McGregor's house. On November 29, 1917, a vast number of nymphs, soldiers, and workers were also collected in the building of the Bureau of Science, at Malate, attacking a mass of papers.

Coptotermes formosanus Shiraki.

Coptotermes formosanus SHIRAKI, Trans. Ent. Soc. Japan 2nd (1909) 239 (Formosa).

Soldier.—Head and labrum deep yellow, tip of labrum hyaline; antennæ somewhat paler; mandibles reddish brown; pronotum yellow; abdomen and legs straw-colored. Head and thorax sparingly pilose; abdominal tergites densely covered with short, spiny hairs.

Head suborbicular, somewhat elongate, sides slightly converging anteriorly; fontanelle distinct, orifice directed forward; clypeus trapezoidal, very short, distinction between anteclypeus and postclypeus obscure; labrum lancet-shaped, with a sharply pointed tip, reaching middle of mandibles; mandibles slender, saber-shaped, with incurved piercing tip, cutting edge smooth;

antennæ 15-jointed, basal joint cylindrical, second joint quadrate, longer than third, third joint the smallest, nearly half as long as fourth, fifth to fourteenth joints suborbicular, apical joint oval; pronotum subreniform, narrower than head, anterior and posterior borders bilobed, lateral borders rounded, converging posteriorly; mesonotum and metanotum oval, the former slightly narrower than pronotum while the latter is much broader.

	mm.
Length of body	4.80-5.50
Length of head, with mandibles	2.19-2.28
Length of head, without mandibles	1.41-1.44
Width of head	1.15-1.21
Width of pronotum	0.81-0.87
Length of pronotum	0.47

Worker.—Head, thorax, and abdomen milk-white, densely pilose.

Head spherical; antennæ 15-jointed, second joint longer than third, third joint ring-shaped, fourth joint a little shorter than second; clypeus more or less swollen; pronotum much narrower than head, semilunar, anterior border obscurely bilobed.

	mm.
Length of body	4.00
Width of head	1.19
Width of pronotum	0.85

LUZON, Manila, February 17, 1917.

Remarks.—The present species is the most serious pest to wooden structures and woodwork in Formosa. It is here recorded for the first time from the Philippine Islands.

RHINOTERMITINÆ

Genus RHINOTERMES Hagen

Rhinotermes (*Schedorhinotermes*) *tarakensis* Oshima. Plate 3, figs. 7 and 8; Plate 4, figs. 6 and 7.

Rhinotermes (*Schedorhinotermes*) *tarakensis* OSHIMA, Annot. Zool. Jap. 8 (1914) 564, pl. 10, fig. 2 (Tarakan, Dutch Borneo).

Imago.—Unknown.

Soldier (*the larger form*).—Head deeply yellow, labrum, antennæ, and labial palpi paler; mandibles light reddish brown; thorax, abdomen, and legs yellow. Head and thorax very sparingly pilose; abdominal tergites moderately covered with delicate hairs and spiny hairs.

Head suborbicular, sides very slightly converging anteriorly, posterior border broadly rounded; fontanelle distinct, directed

obliquely forward; a shallow longitudinal groove from fontanelle to tip of labrum; anteclypeus whitish, anterior border rounded; postclypeus trapezoidal, nearly as long as the former; labrum tongue-shaped, scarcely reaching tip of mandibles, tip hyaline, anterior border obscurely bilobed, densely provided with short hairs; antennæ 15-jointed, first joint cylindrical, second joint slightly shorter than third, quadrate, fourth joint orbicular, nearly as long as third, other joints spherical, subequal in length, apical joint oval; mandibles rather short, with strongly incurved, piercing tip, the left with two sharply pointed teeth, subequal in size, the right with one strong tooth, acutely pointed; pronotum much narrower than head, inverted-heart-shaped, anterior border convex, posterior border weakly incurved at middle, sides rounded; mesonotum slightly narrower than pronotum; metanotum as broad as pronotum, ovoid, much shorter than mesonotum; abdomen rather short; styli one-jointed; hind legs reaching beyond the tip of abdomen.

	mm.
Length of body	3.50
Length of head, with mandibles	1.81-2.00
Length of head, without mandibles	1.18-1.28
Width of head	1.21-1.28
Width of pronotum	0.64-0.70
Length of pronotum	0.43-0.46

Soldier (the smaller form).—

	mm.
Length of body	3.00
Length of head, with mandibles	1.25
Length of head, without mandibles	0.69-0.75
Width of head	0.69-0.72
Width of pronotum	0.43-0.46
Length of pronotum	0.31-0.34

Worker.—

	mm.
Length of body	3.50-4.20
Width of head	1.18-1.25
Width of pronotum	0.53-0.56

LUZON, Laguna Province, San Antonio near Paete, March 12, 1917; discovered under a hard, round, black nest.

Remarks.—There is no previous record of the occurrence of the present species in the Philippine Islands, and the larger form of soldier is here described for the first time.

Rhinotermes (*Schedorhinotermes*) *longirostris* (Brauer).

Termes longirostris BRAUER, Reise Novara, Neur (1865) 47 (Iles Nicobar).

LUZON, Laguna Province, Paete, March 6, 1917; a vast number of soldiers (both forms) and workers.

Remarks.—Tunnels in a much decayed log.

Rhinotermes (*Schedorhinotermes*) *bidentatus* sp. nov. Plate 2, figs. 1 and 2; Plate 3, figs. 9, 10, 13, 14.

Imago.—Unknown.

Soldier (the larger form).—Head dark yellow; antennæ, labial palpi, and labrum somewhat paler; anteclypeus whitish; mandibles reddish brown; pronotum and abdomen yellow. Head and sternites very sparingly provided with spiny hairs; abdominal tergites with a series of delicate hairs along the posterior border, a few scattered spiny hairs.

Head quadrate, sides slightly converging anteriorly, posterior border broadly rounded; fontanelle distinct, directed obliquely forward, situated between roots of antennæ; a shallow groove from fontanelle to tip of labrum, slightly widened anteriorly; clypeus nearly half as long as broad, anterior border rounded, boundary between anteclypeus and postclypeus indistinct; labrum tongue-shaped, anterior border straight, middle part of lateral border swollen; antennæ 16-jointed, basal joint cylindrical, second joint much shorter than third, fourth joint slightly shorter than second, nearly half as long as third, other joints spherical, subequal in length; mandibles rather short, with strongly incurved, piercing tip, the left with two triangular teeth, second tooth much smaller than the other, the right with two sharply pointed subequal teeth directed forward; pronotum narrower than head, subreniform, anterior border convex, posterior border slightly incurved at middle, sides converging posteriorly; mesonotum a little narrower than pronotum; metanotum nearly as broad as mesonotum, posterior border straight; abdomen ovoid; styli 2-jointed; hind legs reaching beyond tip of abdomen.

	mm.
Length of body	6.00–7.00
Length of head, with mandibles	3.00
Length of head, without mandibles	2.00
Width of head	1.86–1.93
Width of pronotum	1.26–1.33
Length of pronotum	0.67

Soldier (the smaller form).—Head dark yellow, antennæ, labrum, and clypeus somewhat paler; anteclypeus whitish; mandibles yellowish brown; thorax, abdomen, and legs yellow. Head,

thorax, and abdominal tergites very sparingly provided with spiny hairs.

Head suborbicular, posterior border broadly rounded; fontanelle distinct, directed obliquely forward; a shallow longitudinal groove from fontanelle to tip of labrum, gradually widening anteriorly; clypeus semilunar, anterior margin rounded, anteclypeus obscurely separated from postclypeus; labrum elongate, extending beyond tip of mandibles, sides nearly parallel, tip distinctly bilobed, anterior margin of each lobe provided with a cluster of short, thick hairs; antennæ 16-jointed, basal joint cylindrical, rather short, second joint quadrate, nearly as long as third, fourth joint the shortest, more than half as long as third, fifth to fifteenth joints spherical, apical joint oval; mandibles slender, with sharply pointed, incurved tip, the left with two acutely pointed teeth, directed forward, second tooth smaller, the right with one tooth, sharply pointed; pronotum narrower than head, anterior border convex, posterior border weakly curved at middle, sides converging posteriorly; mesonotum oval, nearly as broad as pronotum; metanotum slightly broader than mesonotum; abdomen slender, hind legs exceeding its tip.

	mm.
Length of body	4.80-5.20
Length of head, with mandibles	1.87
Length of head, without mandibles	1.09
Width of head	1.00
Width of pronotum	0.81
Length of pronotum	0.50

Worker.—Head pale yellow; thorax and abdomen whitish; anterolateral corners of forehead brown. Head, thorax, and abdominal tergites moderately pilose.

Head quadrate, posterior border broadly rounded; clypeus swollen; antennæ 17-jointed, third joint smallest, half as long as second, fourth and fifth joints subequal; pronotum much narrower than head, more than twice as broad as long, anterior border raised, not bilobed, sides converging posteriorly, posterior border nearly straight, anterolateral corners acutely rounded; abdomen ovoid.

	mm.
Length of body	4.20-5.50
Width of head	1.40
Width of pronotum	0.75

PANAY, Antique Province, Culasi, May 18, 1918.

Remarks.—In a decayed log in forest.

TERMITOGETONINÆ

Genus **TERMITOGETONELLA** novum

Type of genus, *Termitogetonella tibiaoensis* sp. nov.

Termitogetonella tibiaoensis sp. nov. Plate 1, fig. 3; Plate 3, figs. 3 to 6; Plate 4, figs. 2 to 5.

Imago.—Head chestnut brown; postclypeus and antennæ yellowish; anteclypeus whitish; pronotum and abdomen yellowish brown. Head and thorax sparingly pilose, beset with a few spiny hairs; abdominal tergite with two series of spiny hairs along its posterior border, the anterior series composed of much longer hairs.

Head round; fontanelle small, distinct; postclypeus swollen, more than twice as long as anteclypeus; anteclypeus trapezoidal, very short, anterior border straight; labrum tongue-shaped; antennæ 17-jointed, basal joint cylindrical, second joint quadrilateral, much longer than third, fourth joint shorter than third, other joints spherical, subequal in size, apical joint oval; eye moderate, prominent; ocellus oval, approximated to eye; pronotum subreniform, anterior border obscurely bilobed, posterior border nearly straight, sides broadly rounded; mesonotum and metanotum subequal, narrower than pronotum; anterior wing stumps much larger than posterior, covering basal half of the latter; wings hyaline, costal and radius yellowish brown; radius of anterior wing near and parallel to costal, with no branch, median nerve originates from cubitus at the point of basal one-third, connected with the radius by irregular vertical nerves, cubitus runs above the middle of wing, giving off about fifteen branches, most of them connected with each other by short nerves; median nerve of posterior wing originates from radius, running nearer to cubitus than to radius; styli 1-jointed, slender.

	mm.
Length of body, with wings	11.00
Length of body, without wings	6.50
Length of head	1.25
Width of head	1.38
Width of pronotum	1.44
Length of pronotum	0.94
Length of anterior wing	8.50

Soldier.—Head brownish yellow, antennæ and labial palpi paler; mandibles reddish brown, darker anteriorly; pronotum yellow; abdomen and legs straw-colored. Head very coarsely covered with spiny hairs; thorax and abdominal tergites mod-

erately pilose, the latter with a series of spiny hairs along the posterior border.

Head oval; fontanelle obscure; clypeus trapezoidal, indistinctly separated from forehead, not divided into two parts, anterior border straight; labrum tongue-shaped, obtusely pointed anteriorly, tip not reaching the middle of mandibles, provided with a few spiny hairs; mandibles saber-shaped, with incurved and upcurved piercing tip, the left with a sharply pointed tooth at middle of cutting margin, the right nearly smooth with a very low weak tooth; antennæ 17-jointed, basal joint enlarged, cylindrical, second joint elongate, nearly twice as long as third which is the smallest, fourth joint slightly longer than third, subequal to fifth, other joints quadrate, apical one oval; pronotum saddle-shaped, much narrower than head, anterior border bilobed, posterior border weakly incurved at middle, sides strongly converging posteriorly; mesonotum subreniform, narrower than pronotum; metanotum oval, nearly as broad as pronotum; abdomen rather short; styli 1-jointed, hind legs reaching beyond tip of abdomen.

	mm.
Length of body	5.50-7.00
Length of head, with mandibles	3.13-3.24
Length of head, without mandibles	2.08-2.25
Width of head	1.59-1.77
Width of pronotum	1.15-1.29
Length of pronotum	0.69-0.72

Worker.—Head yellow, antennæ and postclypeus somewhat paler; anteclypeus whitish; thorax and abdomen yellowish white. Head nearly smooth, with a few short spiny hairs; thorax and abdomen sparingly pilose.

Head quadrate, shorter than broad, posterior border broadly rounded; postclypeus swollen, trapezoidal; anteclypeus much narrower and shorter than the former, anterior border straight; antennæ 13-jointed, second joint nearly as long as third, fourth joint narrow, half as long as third; pronotum semi-lunar, anterior and posterior borders straight, sides converging posteriorly.

	mm.
Length of body	4.20-5.00
Width of head	1.15-1.44
Width of pronotum	0.94-1.19

PANAY, Antique Province, Tibiao, May 9, 1918; Culasi, May 16, 1918.

Remarks.—Found in an old log.

METATERMITIDÆ

Termes (Macrotermes) philippinensis Oshima.

Termes (Macrotermes) philippinensis OSHIMA, Annot. Zool. Jap. 8 (1914) 566 (Los Baños).

Locality.—LUZON, Manila, Malate, 1918 (W. H. Brown); San Juan del Monte, June 10, 1917: Bulacan Province, Polo, May 30, 1917: Laguna Province, Paete, March 6, 1917; Pañgil, March 25, 1917 (McGregor). PANAY, Antique Province, Culasi, May 26, 1918 (McGregor).

Remarks.—The present species builds a large earth mound on the ground, connected with the subterranean nest. Winged forms swarm at the end of June. The specimens from Malate, Manila, were taken from the mound figured by Brown.¹

Termes (Macrotermes) luzonensis Oshima.

Termes (Macrotermes) luzonensis Oshima, Annot. Zool. Jap. 8 (1914) 569, pl. 9, figs. 10 and 11 (Los Baños).

LUZON, Laguna Province, Pañgil, a large queen, collected on March 25, 1917; Paete, March 10, 1917: San Francisco del Monte near Manila, June 14, 1917.

Remarks.—This species builds a large earth mound. Mr. McGregor found its tunnels on *Artocarpus integrifolia*.

Termes (Macrotermes) manilanus Oshima.

Termes (Macrotermes) manilanus OSHIMA, Annot. Zool. Jap. 8 (1914) 565 (Manila).

Soldiers and workers are still unknown.

PANAY, Antique Province, Lipata near Culasi, July 31, 1918, at night at a lighted lantern on the beach. LUZON, Manila, June 5, 1917.

Termes (Macrotermes) copelandi Oshima.

Termes (Macrotermes) copelandi OSHIMA, Annot. Zool. Jap. 8 (1914) 570, pl. 9, figs. 6 and 7 (Los Baños).

LUZON, Manila, Santa Mesa, Calle Buena Vista, May 27, 1917; San Francisco del Monte, January 14 and February 22, 1917; San Juan del Monte, June 10, 1917; Montalban, February 22, 1918; Antipolo, November 11, 1917. PANAY, Capiz Province, Ibaday, August 9, 1918.

Remarks.—*Termes copelandi* is a species which builds large clay mounds on the ground. Its earthen runways are often found on bamboo fences and on shrubs. According to Mr. Mc-

¹ Philip. Journ. Sci. 13 (1918) Bot. pl. 3.

Gregor's information, it attacks *Eugenia jambolana* and *Leucaena glauca*, making large tunnels on their twigs.

Genus ODONTOTERMES Holmgren

Odontotermes mediudentatus sp. nov. Plate 1, fig. 4; Plate 3, figs. 11 and 12; Plate 4, figs. 8 and 9.

Imago.—Unknown.

Soldier.—Head reddish yellow; antennæ and labial palpi yellow; mandibles dark reddish brown, proximal parts much paler; thorax, abdomen, and legs yellowish. Head sparingly pilose; thorax and abdominal tergites moderately covered with hairs, the latter with a series of short spiny hairs along the posterior borders.

Head ovoid, sides very slightly converging anteriorly, posterior border rounded; no fontanelle; clypeus quadrilateral, not divided into two parts, posteriorly not separated from forehead, anterior border straight; labrum rather short, tongue-shaped, tip obtusely pointed, not reaching middle of mandibles, with no hyaline portion; mandibles rather slender, with incurved piercing tip, the left with two triangular teeth, one at the center, the other at the proximal part, cutting margin of the right smooth; antennæ 16-jointed, first joint cylindrical, exceedingly large, second joint longer than broad, nearly twice as long as third, fourth joint slightly longer than third, fifth joint subequal to third, other joints inverted-cone-shaped, apical joint oval; pronotum saddle-shaped, narrower than head, anterior border entire, posterior border weakly incurved at middle; mesonotum slightly narrower than pronotum, posterior border bilobed; metanotum broader than pronotum, posterior border straight; abdomen rather short; styli 1-jointed.

	mm.
Length of body	5.00–6.00
Length of head, with mandibles	2.56–2.71
Length of head, without mandibles	1.65–1.87
Width of head	1.38–1.50
Width of pronotum	0.97–1.03
Length of pronotum	0.59–0.63

Worker.—Head yellow, antennæ and labial palpi somewhat paler; thorax and abdomen yellowish white. Head densely covered with delicate hairs; thorax and abdominal tergites moderately pilose.

Head orbicular, posterior border rounded, sides very slightly diverging anteriorly; Y-suture not present; postclypeus swollen,

anterior border of anteclypeus broadly rounded; antennæ 17-jointed, first joint elongate, cylindrical, second joint more than twice as long as third which is the smallest, fourth joint shorter than second; pronotum saddle-shaped, much narrower than head, anterior border entire.

	mm.
Length of body	3.50-4.00
Width of head	1.35
Width of pronotum	0.69

LUZON, Laguna, Paete, March 6, 1917.

Remarks.—The present species is very closely related to *Odonotermes denticulatus*, from Singapore. It differs from the latter in having the head and thorax a little larger in the case of the soldier.

Genus EUTERMES Müller

Eutermes (*Hospitalitermes*) *hospitalis* (Haviland). Plate 3, fig. 19; Plate 4, fig. 12.

Termes hospitalis HAVILAND, Journ. Linn. Soc. London 26 (1898) 437, pl. 25, figs. 83-86 (Sarawak and Singapore).

Soldier.—Head, thorax, and abdomen dark castaneous, tip of rostrum somewhat paler; antennæ uniformly yellowish brown; coxa, trochanter, and femur isabelline, tibia and tarsus amber-colored. Head and thorax hairless; anterior border of pronotum provided with a series of short hairs; abdominal tergites sparingly beset with microscopic hairs.

Head pear-shaped, sides somewhat constricted in front; rostrum slender, its upper surface making a marked curve with that of head; antennæ 14-jointed, third joint more than twice as long as second, fourth joint slightly shorter than third, fifth to ninth joints elongate, subequal in length; other joints gradually decreasing in length, inverted-cone-shaped, apical joint oval; mandibles with slender, pointed apical portion; pronotum saddle-shaped, anterior border elevated, not bilobed; legs slender, exceedingly elongate.

	mm.
Length of body	4.50
Length of head, with rostrum	1.80-1.87
Length of head, without rostrum	1.25
Width of head	1.15-1.18
Width of pronotum	0.66

Worker (the larger form).—Head dark castaneous, thorax and abdomen somewhat paler; anteclypeus and labrum brownish yellow; antennæ and labial palpi uniformly isabelline; coxa,

trochanter, and femur yellowish brown, tibia and tarsus amber-colored. Head, thorax, and abdomen sparingly beset with microscopic hairs.

Head round, sides more or less converging anteriorly; Y-suture distinct, whitish; postclypeus swollen, its middle part depressed; anteclypeus short, with rounded anterior border; labrum tongue-shaped, antennæ 15-jointed, second joint much shorter than third, fourth joint shorter than third, but slightly longer than second, other joints elongate, subequal in length, apical joint oval, rather short; pronotum saddle-shaped, anterior border obscurely bilobed.

	mm.
Length of body	4.50-5.20
Width of head	1.12-1.15
Width of pronotum	0.75-0.78

Worker (the smaller form).—Color and hairiness as in the former; antennæ 15-jointed, second to fourth joints subequal in length.

	mm.
Length of body	3.80-4.20
Width of head	1.00
Width of pronotum	0.62

LUZON, San Francisco del Monte near Manila, January 14, 1917.

Remarks.—The present species distinctly differs from *Eutermes* (*H.*) *luzonensis* Oshima, which was formerly described under the name of *Eutermes* (*H.*) *hospitalis*.²

Eutermes (*Ceylonitermes*) *mcgregori* Oshima.

Eutermes (*Ceylonitermes*) *mcgregori* OSHIMA, Philip. Journ. Sci. § D 11 (1916) 361, pl. 1, fig. 19 (Sarai).

Locality.—PANAY, Antique Province, Tibiao; May 14, 1918, found in decayed wood.

Eutermes (*Eutermes*) *gracilis* Oshima.

Eutermes (*Eutermes*) *gracilis* OSHIMA, Philip. Journ. Sci. § D 11 (1916) 362, pl. 1, fig. 9, pl. 2, figs. 4 and 5 (Sarai).

Locality.—LUZON, Laguna Province, Paete, March 10, 1917.

Remarks.—Tunnels built by the present species were found on a palm, *Areca catechu*.

² Philip. Journ. Sci. § D 11 (1916) 360.

Eutermes (*Eutermes*) *balintauacensis* Oshima. Plate 3, fig. 17; Plate 4, fig. 16.

Eutermes (*Eutermes*) *balintauacensis* OSHIMA, Philip. Journ. Sci. § D 12 (1917) 224 (*Balintauac*).

Locality.—LUZON, Laguna Province, Paete, March 10, 1917, from old decayed wood.

Eutermes (*Eutermes*) *castaneus* sp. nov. Plate 2, fig. 4; Plate 3, fig. 18; Plate 4, fig. 15.

Imago.—Unknown.

Soldier.—Head brownish yellow, rostrum somewhat darker, antennæ dark yellow; thorax and abdomen pale chestnut-colored; labial palpi and legs straw-colored. Head and thorax sparingly provided with long spiny hairs; abdominal tergites densely pilose, long spiny hairs intermingled with minute ones.

Head broadly oval, sides strongly converging anteriorly, dorsal profile not straight, with a swelling at the junction of rostrum; rostrum rather long, slender, its upper surface on the same plane as that of the head; mandibles with more or less developed apical portion; antennæ 13-jointed, basal joint much enlarged, third joint elongate, nearly twice as long as fourth, second joint slightly longer than fourth, other joints inverted-cone-shaped, apical joint oval; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	3.00–3.20
Length of head, with rostrum	1.47–1.59
Length of head, without rostrum	0.81–0.84
Width of head	0.81–0.84
Width of pronotum	0.44–0.47

Worker.—Head yellow; antennæ and labial palpi much paler; thorax and abdomen yellowish white. Head, thorax, and abdominal tergites densely covered with short hairs.

Head quadrate, posterior border broadly rounded; Y-suture obscure; postclypeus more or less swollen, much shorter than half its width; anteclypeus longer than the former, obtusely pointed anteriorly; antennæ 14-jointed, second joint much longer than third, fourth joint the smallest, ring-shaped, nearly half as long as third; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	4.00–4.20
Length of head	1.09
Width of pronotum	0.59

LUZON, Laguna Province, Sarai near Paete, March 19, 1917.
PANAY, Antique Province, Culasi, June 13, 1918.

Remarks.—The present species is very closely allied to *Eutermes gracilis*, from Sarai. The soldier of the latter has a wider head and a longer fourth antennal joint.

Eutermes (Eutermes) las-piñasensis sp. nov. Plate 2, fig. 3; Plate 4, fig. 13.

Imago.—Unknown.

Soldier.—Head yellowish brown; tip of rostrum reddish brown; pronotum brownish; antennæ, abdomen, and legs dark yellow. Head nearly smooth, with a few long spiny hairs; thorax smooth; abdominal tergites beset with microscopic hairs, posterior ones with a small number of long spiny hairs.

Head round, sides converging anteriorly, dorsal profile nearly straight, making a very weak curve; rostrum rather short, conical; mandible with a short, pointed apical portion; antennæ 13-jointed; second joint a little longer than fourth, third joint the longest, much longer than second; pronotum saddle-shaped, anterior border rounded.

	mm.
♀ Length of body	3.20–3.80
Length of head, with rostrum	1.59–1.62
Length of head, without rostrum	0.94–1.00
Width of head	0.94–1.00
Width of pronotum	0.47–0.50

Worker.—Head dark brown; anteclypeus yellowish; thorax and abdomen yellowish white; antennæ and legs dark yellow. Head moderately pilose; thorax nearly smooth, pronotum with a series of short hairs along the anterior border; abdominal tergites beset with minute hairs.

Head round, Y-suture distinct, whitish; postclypeus more or less swollen, much shorter than half the width; antennæ 14-jointed, third joint elongate, very slightly longer than second, fourth joint the smallest, nearly half as long as third; pronotum saddle-shaped, anterior border obscurely bilobed.

	mm.
Length of body	4.00
Width of head	1.19–1.22
Width of pronotum	0.59–0.69

LUZON, Paco, April 30, 1917: Rizal Province, Las Piñas, May 6 and 20, 1917: Laguna Province, Sarai, March 19, 1917: Bulacan Province, north of Polo, May 30, 1917.

Remarks.—Very closely allied to *Eutermes buitenzorgi* Holmgren, from Java. The soldier of the present species differs from that of the former in having a longer head.

A nest was found at the base of a small *Pithecolobium dulce*. It was actually observed that *Eutermes las-piñasensis* attacks *Barringtonia* and the above-mentioned tree, making wide-covered tunnels over the trunks.

Eutermes (*Trinervitermes*) *menadoensis* Oshima.

Eutermes (*Trinervitermes*) *menadoensis* OSHIMA, Annot. Zool. Jap. 8 (1914) 580, pl. 10, figs. 9 and 10 (Menado, Celebes).

LUZON, San Francisco del Monte, February 22, 1917; Masambuang, near Manila, February 22, 1917; Laguna Province, Paete, March 10, 1917.

Remarks.—The present species sometimes attacks *Ficus* and *Barringtonia*, making covered tunnels from nests in the ground.

Eutermes (*Rotunditermes*) *culasiensis* sp. nov. Plate 2, fig. 6; Plate 3, fig. 20; Plate 4, fig. 14.

Imago.—Unknown.

Soldier.—Head, antennæ, and labial palpi yellow; rostrum reddish brown, paler posteriorly; pronotum yellowish, with brownish anterior border; abdomen white; legs straw-colored. Head very sparingly beset with spiny hairs; thorax roughly pilose; abdominal tergites covered with minute hairs.

Head turnip-shaped, with a slender conical rostrum, dorsal profile nearly straight, making a curve; antennæ 12-jointed, second joint nearly as long as third, fourth joint slightly longer than third, other joints subequal in length; mandible with a short apical portion which is sharply pointed; pronotum saddle-shaped, anterior border entire, not bilobed.

	mm.
Length of body	3.20–3.80
Length of head, with rostrum	1.44–1.50
Length of head, without rostrum	0.85–0.94
Width of head	0.94–0.97
Width of pronotum	0.44–0.47

Worker.—Head yellow; antennæ, labial palpi, and thorax straw-colored; abdomen whitish. Head sparingly pilose; thorax and abdominal tergites moderately covered with minute hairs.

Head quadrate, posterior border broadly rounded; Y-suture distinct, whitish; postclypeus swollen, nearly twice as broad as

long; anteclypeus short, obtusely pointed anteriorly; antennæ 13-jointed, second joint longer than fourth, third joint the smallest, shorter and narrower than fourth; pronotum saddle-shaped, anterior border distinctly bilobed.

	mm.
Length of body	4.20
Width of head	1.00
Width of pronotum	0.60

PANAY, Antique Province, Culasi, May 16, 1918, found in the bark of a decayed log.

Eutermes (Grallatotermes) luzonicus Oshima.

Eutermes (Grallatotermes) luzonicus OSHIMA, Annot. Zool. Jap. 8 (1914) 581, pl. 10, figs. 15 and 16 (Los Baños).

LUZON, San Juan del Monte near Manila, June 10, 1917: Rizal Province, Las Piñas, May 6, 1917: Laguna Province, Paete, March 4, 1917. PANAY, Antique Province, Tibiao, May 4, 1918: Capiz Province, Ibajay, August 9, 1918.

Remarks.—The present species attacks *Pithecolobium dulce*, *Spondias purpurea*, bamboos, and cocos. Very often it enters houses, attacking wooden parts.

Eutermes (Grallatotermes) panayensis sp. nov. Plate 2, fig. 5.

Imago.—Unknown.

Soldier (the larger form).—Head and abdominal tergites dark brown, thorax somewhat paler; rostrum reddish brown; antennæ and legs dark yellow. Head and thorax beset with a small number of long spiny hairs; abdominal tergites moderately covered with microscopic hairs, long spiny hairs intermingled with them.

Head round, dorsal profile weakly incurved at the junction of rostrum; rostrum rather short, cone-shaped; mandible with a short apical portion, sharply pointed; antennæ 13-jointed, second joint slightly longer than fourth, third joint the longest, much longer than second, other joints ovoid, elongate, subequal in length; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	4.50
Length of head, with rostrum	1.59–1.62
Length of head, without rostrum	1.03–1.06
Width of head	0.94–0.97
Width of pronotum	0.60

Soldier (the smaller form).—Head and rostrum uniformly reddish brown; thorax yellowish brown; abdominal tergites

chestnut-colored; antennæ and legs yellow. Head and thorax with a small number of long, spiny hairs; abdominal tergites densely covered with microscopic hairs, with a series of long, spiny hairs along their posterior borders.

Head pear-shaped, sides converging anteriorly, dorsal profile nearly straight, with a weak swelling at the junction of rostrum; rostrum rather slender, conical; antennæ 13-jointed, second joint slightly longer than fourth, third joint the longest, much longer than second; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	3.00-3.80
Length of head, with rostrum	1.41-1.53
Length of head, without rostrum	0.88-0.94
Width of head	0.78-0.88
Width of pronotum	0.44

Worker.—Head and abdominal tergites dark brown; thorax yellowish brown; antennæ and legs dark yellow. Head pilose, long spiny hairs intermingled with microscopic ones; thorax nearly smooth, anterior border of pronotum provided with a series of short hairs; abdominal tergites moderately covered with minute hairs.

Head round, Y-suture distinct; forehead inclined anteriorly, postclypeus swollen, shorter than half the width; anteclypeus obtusely pointed anteriorly; antennæ 14-jointed, second nearly as long as third, fourth joint much shorter than third; pronotum saddle-shaped, anterior border rounded.

	mm.
Length of body	4.20-4.50
Width of head	1.06-1.09
Width of pronotum	0.60-0.66

PANAY, Antique Province, Culasi, July 16, 1918; tunnels on a large tree.

Genus *CAPRITERMES* Wasmann

Capritermes paetensis sp. nov. Plate 2, figs. 7 and 8; Plate 3, figs. 15 and 16; Plate 4, figs. 10 and 11.

Imago.—Unknown.

Soldier.—Head brownish yellow, darker anteriorly, antennæ, labial palpi, and labrum somewhat paler; mandibles dark reddish brown, the left much darker; pronotum dark yellow, mesonotum and metanotum paler; abdomen and legs straw-colored. Head and thorax sparingly provided with spiny hairs; abdominal tergites with two transverse series of spiny hairs, interspace of which is roughly covered with minute hairs.

Head cylindrical, sides very slightly converging anteriorly, posterior border rounded; forehead abruptly inclined, more or less concave, with a shallow median groove; the vertical part of Y-suture deeply colored; fontanelle small; antennæ 14-jointed, basal joint cylindrical, exceedingly large, second joint quadri-lateral, slightly shorter than third, fourth joint the shortest, much shorter than second, fifth to thirteenth joints elongate, club-shaped; anteclypeus quadrate, nearly as long as broad; postclypeus considerably shorter than the former, distinctly separated from forehead; labrum short, asymmetrical, much enlarged anteriorly, anterior border nearly straight, provided with a few long hairs, left anterolateral corner sharply pointed, the right obtusely rounded; mandibles asymmetrical, the right shorter and straighter, with an outcurved piercing tip, the left much bent, S-shaped, the basal third directed inward, the outer margin becoming gradually the upper, the middle third bending quickly outward, the apical third directed forward, the upper margin becoming again the outer, the tip obtusely pointed; gula elongate, narrow, much enlarged anteriorly, lateral borders concave; pronotum saddle-shaped, much narrower than head, anterior border rounded, posterior border obscurely bilobed; mesonotum narrower than pronotum, metanotum nearly as broad as pronotum; styli 1-jointed; hind legs slender, reaching beyond tip of abdomen.

	mm.
Length of body	5.50-6.00
Length of head, with mandibles	4.00-4.20
Length of head, without mandibles	2.20-2.30
Width of head	1.20
Width of pronotum	0.75-0.87

Worker.—Head yellow, antennæ somewhat paler; abdomen milk-white. Head sparingly pilose; abdominal tergites moderately covered with minute hairs.

Head spherical, Y-suture and fontanelle obscure; antennæ 14-jointed, second and third joints subequal in length, slightly shorter than fifth, fourth joint the smallest, nearly half as long as fifth; pronotum much narrower than head, saddle-shaped, anterior border rounded.

	mm.
Length of body	4.50
Width of head	1.00
Width of pronotum	0.56

LUZON, Laguna Province, Paete, March 10, 1917; in damp ground under vegetable waste.

Remarks.—The nearest relative of the present species is *Capritermes distinctus*, from Ceylon. The soldier of the latter is smaller and is provided with a broader pronotum and with shorter mandibles. Its worker is also smaller than that of *C. paetensis*, measuring 2.7 to 2.8 millimeters.

Genus **MICROCEROTERMES** Wasmann

Microcerotermes los-banosensis Oshima.

Microcerotermes los-banosensis OSHIMA, Annot. Zool. Jap. 8 (1914) 583, pl. 10, fig. 6 (Los Baños).

Imago.—Head and pronotum chestnut brown; clypeus, labrum, and antennæ yellowish brown; abdomen dark brown; legs dark yellow. Head moderately pilose, covered with delicate hairs and a small number of spiny hairs; pronotum and wing stumps beset with strong spiny hairs; mesonotum and metanotum covered with minute hairs; abdominal tergites densely covered with delicate hairs.

Head round, no fontanelle; anteclypeus whitish, much shorter than postclypeus, anterior border obtusely pointed; postclypeus swollen, nearly half as long as broad; labrum tongue-shaped, broader than long; eye moderate, slightly prominent; ocellus round, the distance from eye less than twice its diameter; antennæ 14-jointed, basal joint cylindrical, much enlarged, second joint quadrilateral, twice as long as third which is the smallest, fourth joint slightly shorter than second, other joints spherical, subequal in length, apical joint oval; pronotum narrower than head, subreniform, anterior border nearly straight, posterior border weakly indented at middle, sides converging posteriorly; mesonotum and metanotum subequal, longer than pronotum, their posterior borders strongly indented at the middle; anterior wing stumps larger than posterior, not covering the base of the latter; wings brownish, coarsely beset with short, spiny hairs; radius nerve of anterior wing nearly straight, not branched, running near and parallel to costal margin, median nerve nearer to cubitus than to radius, bifurcated at tip, cubitus with seven branches, not reaching tip of wing, its root united to that of median nerve, dental nerve distinct; median nerve of posterior wing originates from the proximal part of radius; cubitus with eight branches; styli short; hind legs not reaching tip of abdomen.

	mm.
Length of body, with wings	8.00-9.00
Length of body, without wings	4.50-5.00
Length of head	0.85-0.91
Width of head	0.78-0.81
Width of pronotum	0.66-0.72
Length of pronotum	0.38-0.44

Ergatoid.—Head and pronotum chestnut brown; antennæ yellowish brown; wing pads and abdominal tergites chestnut brown, somewhat paler than head; legs and integument of abdomen dark yellow. Head moderately covered with delicate hairs; pronotum and wing pads sparingly pilose, abdominal tergites densely beset with minute hairs.

Head round; no fontanelle; anteclypeus nearly half as long as postclypeus, anterior border obtusely pointed; postclypeus swollen, twice as broad as long; labrum tongue-shaped; eye more or less prominent; ocellus yellowish, round, the distance to the eye less than twice as long as its diameter; antennæ 14-jointed, basal joint cylindrical, elongate, second joint longer than fourth, third joint ring-shaped, half as long as fourth, fifth joint quadrate, other joints ovoid, subequal in length; pronotum slightly narrower than head, semilunar, anterior border nearly straight, posterior border obscurely bilobed, sides rounded, converging posteriorly; mesonotum slightly longer than pronotum, posterior border straight; metanotum as long as pronotum, with straight posterior border; wing pads well-developed, produced posteriorly, tip of the anterior pair reaching beyond posterior border of metanotum, posterior pair shorter than the anterior; abdomen enlarged, integument between abdominal tergites extended; styli rather short, 2-jointed.

	mm.
Length of body	6.00-10.00
Length of head	0.85
Width of head	0.85
Width of pronotum	0.75
Length of pronotum	0.47

Soldier.—

	mm.
Length of body	5.00-5.50
Length of head, with mandibles	2.44-2.66
Length of head, without mandibles	1.50-1.56
Width of head	1.00-1.03
Width of pronotum	0.63-0.69
Length of pronotum	0.32-0.35

Worker.—

	mm.
Length of body	4.00–4.50
Width of head	0.94–1.03
Width of pronotum	0.53–0.58

LUZON, Manila, Malate, December 31, 1916; San Francisco del Monte, February 22, 1917; Masambuang, January 14, 1917; Las Piñas, May 20, 1917; Guadalupe, January 6, 1917: Bulacan Province, Polo, May 31, 1917 (imagoes, soldiers, and workers): Laguna Province, San Antonio near Paete, March 13, 1917; Sarai near Paete, March 19, 1917. PANAY, Antique Province, Tibiao, May 9, 1918; Culasi, June 6, 1918; Batbatan Island, June 30, 1918. ROMBLON, August 13, 1918 (imagoes, soldiers, and workers).

Remarks.—The present species seems to be one of the commonest termites in the Philippine Islands. Occasionally it attacks *Pithecolobium dulce*, cocos, or bamboos, constructing small, hard nests at their bases or below the ground.

Among the individuals that were collected at Tibiao, on May 9, 1918, were sixteen grown-up ergatoids, together with a vast number of young larvæ and eggs.

ILLUSTRATIONS

PLATE 1

- FIG. 1. *Calotermes* (N.) *malatensis* Oshima, soldier.
 2. *Calotermes* (N.) *lagunensis* sp. nov., soldier.
 3. *Termitogetonella tibiaoensis* g. et sp. nov., soldier.
 4. *Odontotermes mediodentatus* sp. nov., soldier.

PLATE 2

- FIG. 1. *Rhinotermes* (Sch.) *bidentatus* sp. nov., larger form of soldier.
 2. *Rhinotermes* (Sch.) *bidentatus* sp. nov., smaller form of soldier.
 3. *Eutermes* (E.) *las-piñasensis* sp. nov., soldier.
 4. *Eutermes* (E.) *castaneus* sp. nov., soldier.
 5. *Eutermes* (G.) *panayensis* sp. nov., soldier.
 6. *Eutermes* (R.) *culasiensis* sp. nov., soldier.
 7. *Capritermes paetensis* sp. nov., soldier.
 8. *Capritermes paetensis* sp. nov., soldier's head.

PLATE 3

- FIG. 1. *Calotermes* (N.) *lagunensis* sp. nov., soldier's left mandible.
 2. *Calotermes* (N.) *lagunensis* sp. nov., soldier's right mandible.
 3. *Termitogetonella tibiaoensis* g. et sp. nov., imago's anterior wing.
 4. *Termitogetonella tibiaoensis* g. et sp. nov., imago's posterior wing.
 5. *Termitogetonella tibiaoensis* g. et sp. nov., soldier's left mandible.
 6. *Termitogetonella tibiaoensis* g. et sp. nov., soldier's right mandible.
 7. *Rhinotermes* (Sch.) *tarakensis* Oshima, soldier's left mandible (larger form).
 8. *Rhinotermes* (Sch.) *tarakensis* Oshima, soldier's right mandible (larger form).
 9. *Rhinotermes* (Sch.) *bidentatus* sp. nov., soldier's left mandible (smaller form).
 10. *Rhinotermes* (Sch.) *bidentatus* sp. nov., soldier's right mandible (smaller form).
 11. *Odontotermes mediodentatus* sp. nov., soldier's left mandible.
 12. *Odontotermes mediodentatus* sp. nov., soldier's right mandible.
 13. *Rhinotermes* (Sch.) *bidentatus* sp. nov., soldier's left mandible.
 14. *Rhinotermes* (Sch.) *bidentatus* sp. nov., soldier's right mandible.
 15. *Capritermes paetensis* sp. nov., soldier's left mandible.
 16. *Capritermes paetensis* sp. nov., soldier's right mandible.
 17. *Eutermes* (E.) *balintauacensis* Oshima, soldier's mandible.
 18. *Eutermes* (E.) *castaneus* sp. nov., soldier's mandible.
 19. *Eutermes* (H.) *hospitalis* (Haviland), soldier's mandible.
 20. *Eutermes* (R.) *culasiensis* sp. nov., soldier's mandible.

PLATE 4

- FIG. 1. *Calotermes* (N.) *lagunensis* sp. nov., soldier's antenna.
2. *Termitogetonella tibiaoensis* g. et sp. nov., soldier's antenna.
3. *Termitogetonella tibiaoensis* g. et sp. nov., imago's left mandible.
4. *Termitogetonella tibiaoensis* g. et sp. nov., imago's right mandible.
5. *Termitogetonella tibiaoensis* g. et sp. nov., soldier's labrum.
6. *Rhinotermes* (Sch.) *tarakensis* Oshima, soldier's antenna (larger form).
7. *Rhinotermes* (Sch.) *tarakensis* Oshima, soldier's labrum and clypeus (larger form).
8. *Odontotermes mediodentatus* sp. nov., soldier's antenna.
9. *Odontotermes mediodentatus* sp. nov., soldier's labrum.
10. *Capritermes paetensis* sp. nov., soldier's antenna.
11. *Capritermes paetensis* sp. nov., soldier's labrum.
12. *Eutermes* (H.) *hospitalis* (Haviland), soldier's antenna.
13. *Eutermes* (E.) *las-piñasensis* sp. nov., soldier's antenna.
14. *Eutermes* (R.) *culasiensis* sp. nov., soldier's antenna.
15. *Eutermes* (E.) *castaneus* sp. nov., soldier's antenna.
16. *Eutermes* (E.) *balintauacensis* Oshima, soldier's antenna.

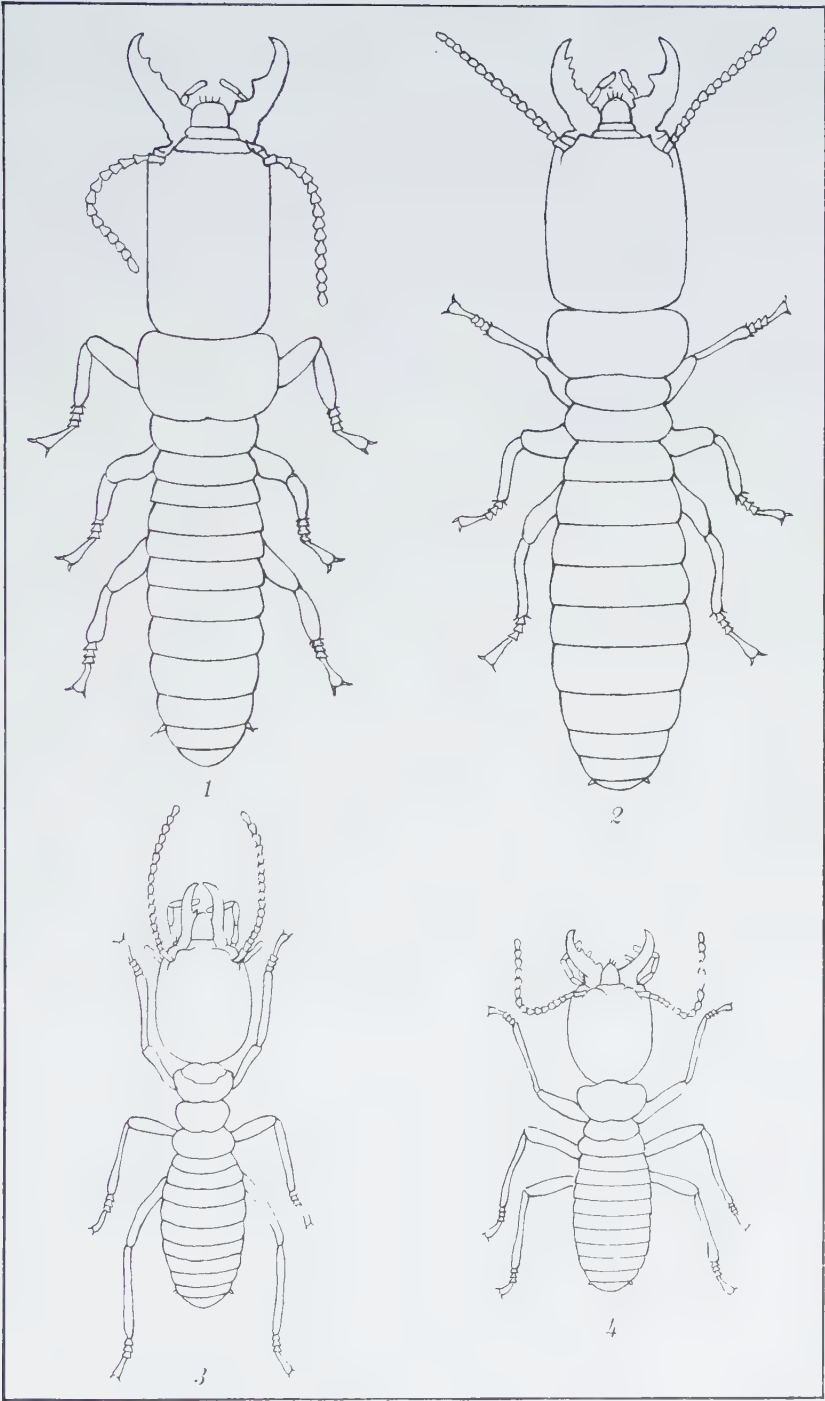


PLATE 1. PHILIPPINE TERMITES.

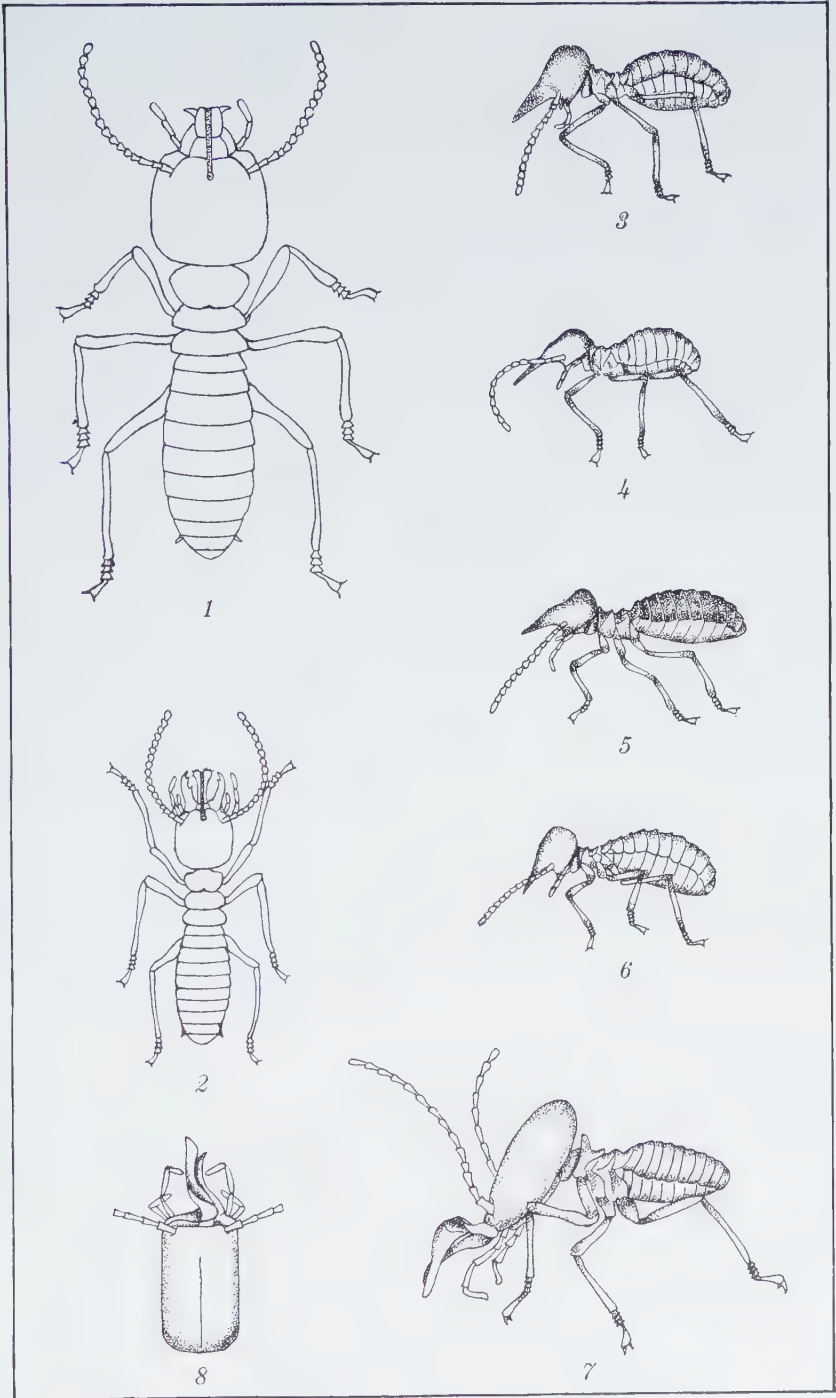


PLATE 2 PHILIPPINE TERMITES.

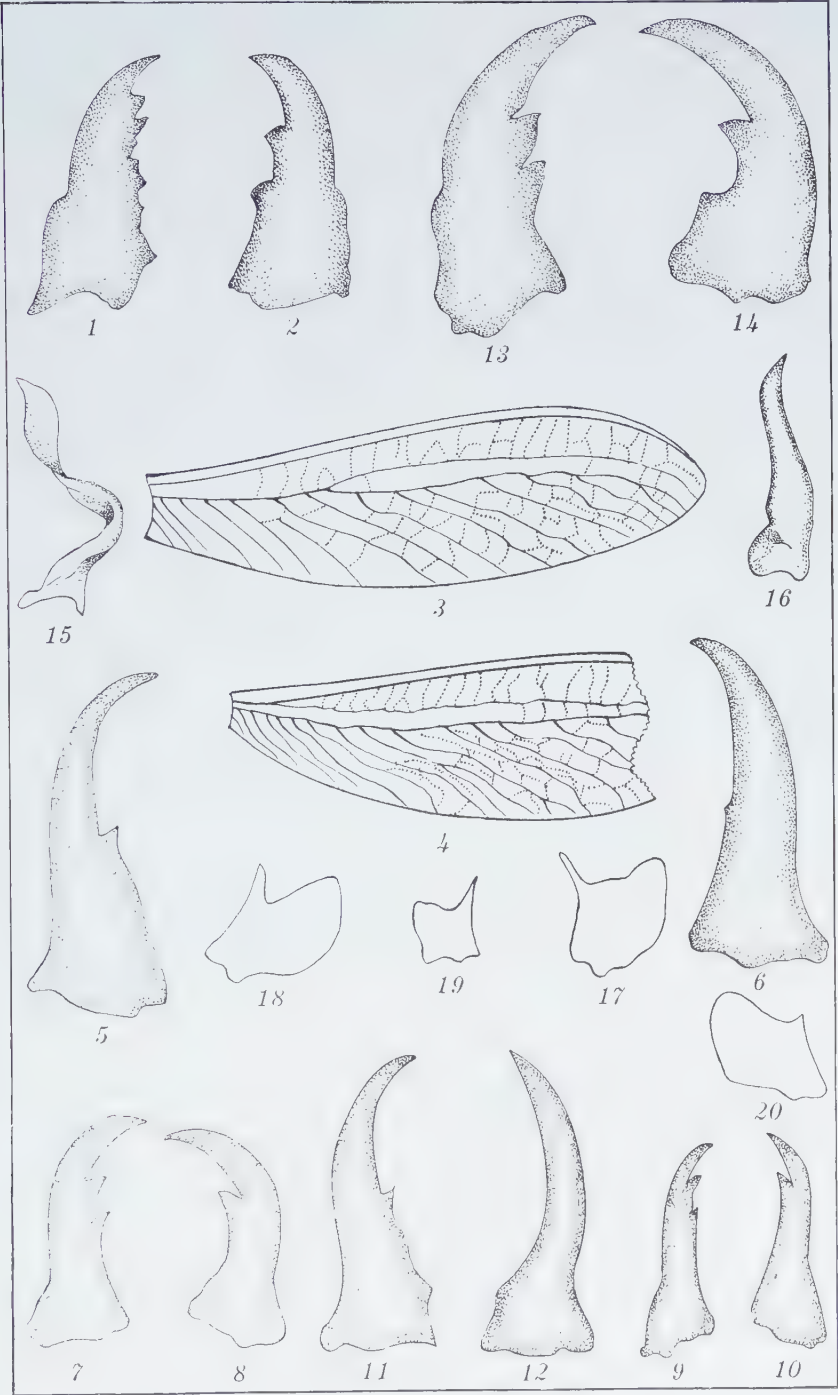


PLATE 3. PHILIPPINE TERMITES.

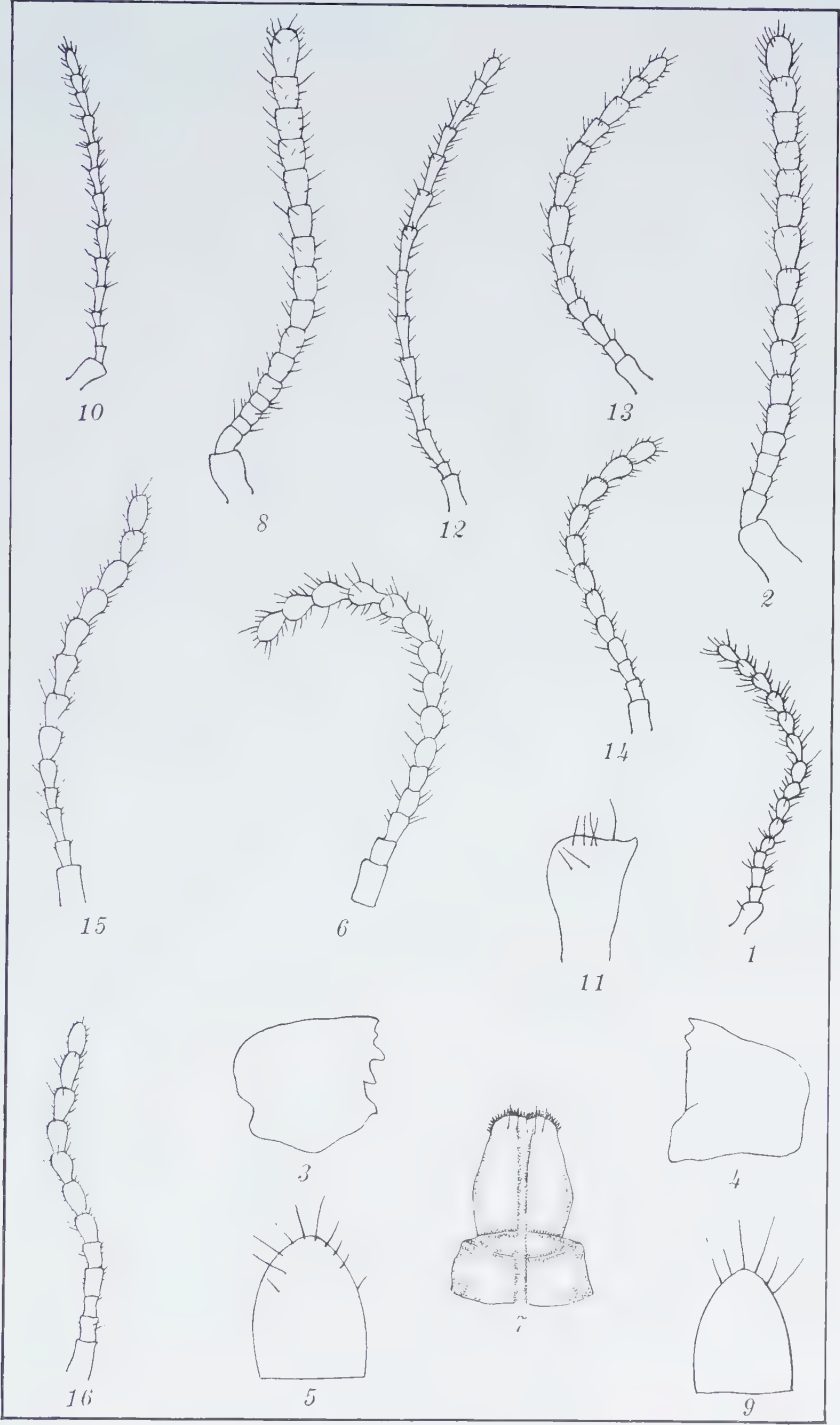


PLATE 4 PHILIPPINE TERMITES.

THE OCCURRENCE IN THE PHILIPPINE ISLANDS OF
THE FRESH-WATER AMPHIPOD PARACALLIOPE
FLUVIATILIS (G. M. THOMSON)

By CHAS. CHILTON

Professor of Biology, Canterbury College, New Zealand

The amphipod *Paracalliope fluviatilis* was described in 1879 by G. M. Thomson, under the name *Calliope fluviatilis*, as occurring in fresh-water streams near Dunedin, New Zealand. Subsequently it was found to be common in fresh-water streams in all parts of New Zealand and to occur also in harbors, tidal estuaries, etc., where the water was brackish or at times quite salt. In 1899 Stebbing established the genus *Paracalliope* for this species and in 1906¹ he referred to it the species that had been described by W. A. Haswell in 1880 as *Pherusa australis* from specimens obtained at Botany Bay. Though nothing was said about the exact circumstances under which these specimens were found, it is to be presumed that they were taken in salt waters. Although I have been unable to obtain specimens of *Pherusa australis* from Australia for comparison, I feel confident that Stebbing is right in considering that species as a synonym of *Paracalliope fluviatilis*.

Recently when examining the amphipods from Chilka Lake, India, I found numerous specimens of *Paracalliope fluviatilis* from different localities in the lake and others from Adyar River near Madras. Apparently it occurs on the shores of India under similar conditions to those in New Zealand. About a month after the manuscript of my report on the Chilka Lake amphipoda had been posted I received a few amphipoda from the Philippine Islands sent by Prof. C. F. Baker, and among them there were several specimens of *Paracalliope fluviatilis* from Nasugbu, "shallow water." Along with them was a single specimen of *Photis longicaudata* (Bate and Westw.), but there was no record as to whether the specimens were obtained in fresh water or in salt. The specimens both from Chilka Lake

¹ Das Tierreich, Amphipoda, p. 297.

and from the Philippine Islands agree very closely with those from New Zealand, and I can find no difference of specific importance.

As *Paracalliope fluviatilis* appears to be confined to fresh and brackish water near the coast, its wide distribution in India, Philippine Islands, and New Zealand will help to throw light on the changes in the land areas of these regions that must have occurred to account for its present distribution. In this connection it may be mentioned that *Paracorophium excavatum* (G. M. Thomson), another amphipod occurring in brackish and fresh waters of New Zealand, has recently been sent to me from brackish waters in Brisbane River, Queensland, Australia.

NIPHARGUS PHILIPPENSIS, A NEW SPECIES OF AMPHIPOD FROM THE UNDERGROUND WATERS OF THE PHILIPPINE ISLANDS

By CHAS. CHILTON

Professor of Biology, Canterbury College, New Zealand

THREE PLATES

For the opportunity of examining the interesting amphipod described in this paper I am indebted to Prof. C. F. Baker, of the College of Agriculture, Los Baños, Philippine Islands. By a fortunate coincidence the specimens forwarded by Professor Baker arrived just at the time when I was examining a new species of *Niphargus* from Chilka Lake, India; for, though different in several characters, the Philippine species is evidently closely related to the one from Chilka Lake. Professor Baker says that there are many subterranean drainage streams in the Philippine Islands, and wells frequently tap such streams; but near Los Baños the geological formation is all volcanic, and the waters usually emerge hot. He had examined several wells for amphipods without success, but recently Mr. S. Lantican, one of the students in zoölogy, found a well with moving cool water in the bottom and from this obtained the amphipods that were submitted to me. So far as is known, this is the first discovery of underground Crustacea in the Philippine Archipelago. From the statements made below it will be seen that the species differs from the description of the genus *Niphargus* given by Stebbing(4) in one or two points, in which, however, it agrees with the Chilka Lake species. The majority of the other characters are, nevertheless, so close to those of European species of *Niphargus* that I prefer to leave the species in the meantime under that genus.

NIPHARGUS PHILIPPENSIS sp. nov.

Specific diagnosis.—Body long and narrow, side plates 1 to 4 shallower than their respective segments. Pleon segments 1 to 3 with the posterolateral corners rounded and bearing short setules in slight indentations. Eyes wanting. First antenna nearly as long as the body; second joint about as long as the

first, third about one-third as long as the second; flagellum of about thirty joints, rather stout; secondary appendage very small, of two minute joints, shorter than the first joint of the primary flagellum. Second antenna about as long as the peduncle of the upper; flagellum of about six joints, the first being much longer than the others. First gnathopod with basal joint broad, ischium rounded on posterior side and covered with minute setæ; carpus slightly longer and broader than the propod; palm transverse, slightly convex. Second gnathopod with carpus subtriangular, propod narrow, oval, palm very oblique, occupying more than half the posterior margin of the propod, nearly straight, defined by one or two stout setules. First and second peræopods with the basal joint broadened, oval, greatest breadth about half the length. Fifth peræopod with basal joint of moderate size, remaining joints slightly broadened. Third uropods, when fully developed, about three-fourths the length of body, peduncle elongated, outer branch elongated, of two very long joints, first somewhat longer than the second, inner branch very small. Telson cleft to the base, each lobe bearing a stout seta at about the middle of the lateral margin and another near the extremity, with a minute setule placed at the extremity nearer the median line. Length of body, about 8 millimeters. Color, whitish.

Locality.—"From a well at Los Baños, Luzon. Collected by S. Lantican."

In addition to the specific diagnosis given above, the following further details may be useful. In general shape of the body the species resembles *Niphargus chilkenensis* and most of the other species of the genus, the body being long, slender, and with the side plates much shallower than their respective segments. The head is produced laterally between the bases of the upper and lower antennæ into a distinct, rounded lobe. The pleon segments are not much produced downward, the first less so than the second and third; their lower margins are convex, the postero-inferior angle being broadly rounded and provided with minute setules arising from small indentations or serrations. The dorsal surface of the body is free from hairs or setæ.

The branchiæ are regularly oval, thus differing in shape from those of *N. chilkenensis*, which are broad at the base. The anterior pairs are apparently smaller than the posterior. The length of the body of one specimen mounted on a micro-slide is about 8 millimeters, that of the upper antennæ being about

the same, and the third uropod when fully developed about 5.5 millimeters.

In the upper antennæ the first and second joints of the peduncle are of about equal length, the first pair bearing at the end a distinct setule on the lower margin, and a few finer setules at the end of the second joint. The third joint is about one-third the length of the first. The flagellum is greatly elongated, sometimes containing as many as thirty-six joints, as shown in Plate 1, fig. 1; in this specimen the antenna on the other side was shorter and contained only twenty-eight joints. The accessory appendage is minute, consisting of two very small joints, and is easily overlooked. It will be seen from this description that the first antenna differs considerably from that of *N. chilensis* in which the second joint of the peduncle is greatly elongated and bears distinct tufts of setæ on the upper margin toward its extremity. In the second antenna the gland cone is distinct, the last two joints of the peduncle subequal in length, the flagellum consisting of six distinct joints, the first much longer than any of the others, being nearly as long as the rest of the flagellum. In *N. chilensis* the joints of the flagellum are faced together.

The upper lip is regularly rounded and slightly more convex near the median line where it is covered in the usual manner by a fur of minute setæ.

In the mandible the first joint of the palp is rather elongated, about one-third that of the second which is somewhat curved and slightly broadened, the third joint is about as long as the second and bears toward the extremity a number of setæ fully as long as the joint itself and extending almost at right angles to it. The cutting edges are normal and do not call for special description; the spine row contains numerous plumose spines. There seems to be little difference between the right and left mandibles.

The lower lip is of the usual shape, the mandibular process on each side being well marked and with the extremity rounded; the inner lobes are distinct, but rather small.

The first maxilla has the inner lobe well developed, broad, its oblique apical margin bearing twelve or more plumose setules; the outer lobe is of the usual shape, bearing about nine denticulate setules; the palp appears to be the same on both sides and bears at the apex some stout setules and a few slender hairs.

The second maxilla has the two lobes of about equal size, the outer with apical setæ only, the inner bearing an oblique row of long setæ near the inner margin in addition to those along the margin itself which merge into the usual apical setæ.

The maxillipeds have the inner lobe reaching about halfway along the outer, its truncate extremity with three stout setules and many smaller setules and hairs. The outer lobe is short, not reaching so far as the end of the carpus, its inner margin bearing stout setules, none of which are developed into spine teeth. The propod is much narrowed at the base, the dactyl is long and slender, nearly as long as the propod. In addition to the ordinary long setæ numerous fine short setules are present on the dactyl and on the distal portion of the propod.

The first gnathopod has the side plate produced a little anteriorly, the angle being rounded, the basal joint is broad with tufts of setæ on the posterior margin. The ischium is produced on the inner side into a rounded lobe, the whole of which is covered by minute setæ. Probably this joint meets the corresponding one on the other side when the limbs are being used and forms a grasping or tritulating organ accessory to the appendages of the mouth. The carpus is considerably longer than the propod, its inner surface being thickly covered with tufts of long setæ as shown in Plate 1, fig. 1; the propod has the palm transverse and slightly convex.

The second gnathopod is considerably larger than the first, and differs to a rather marked degree in the shape of the carpus and propod; the carpus is triangular, with the tufts of setæ on its posterior margin compressed closely together; the propod is much longer than the carpus, oval, narrowing distally, the palm is slightly sinuous or nearly straight and much longer than the remaining portion of the posterior margin; the finger is strong and somewhat broad toward the base, but in the specimens examined does not show the bulging on the inner margin that is found in *N. chilensis*.

The first and second peræopods are subequal and similar in structure. The basal joint has the anterior margin produced and strongly convex so that the whole joint forms an oval, the greatest breadth being rather more than half the length; the posterior margin is somewhat serrate with long hairs arising from the shallow serrations; the merus, carpus, and propod are of about the same length and bear only a few setules, two on the posterior margin of the propod being stouter than the others; the finger is rather short, acutely pointed.

The third peræopod is about the same length as the first and second, the basal joint is oval but the posterior margin is not greatly produced; it bears a number of fine setæ in small indentations; the carpus and propod are subequal and shorter than the merus.

The fourth peræopod is similar in shape and structure to the third but is longer, being intermediate in length between the third and fifth peræopods.

The fifth peræopod is much longer than the third and fourth but similar as regards the shape of the basal joint; the carpus and propod, however, are considerably longer in proportion to the merus, all three joints being slightly widened, their margins bearing stout setules arising from slight serrations; the finger is small and acute.

The pleopods are all well developed, the branches in each being equal in length and many-jointed.

The first and second uropods extend backward to about the same point; in the first uropod the peduncle is much longer than the branches, and the outer branch is slightly shorter than the inner. The second uropod is similar but has the peduncle much shorter, and the difference in length between the two branches is slightly greater. The third uropod is greatly elongated appearing, however, to differ in length according to the development of the animal. In some specimens examined it is more than half the length of the body. The peduncle is long, being nearly three times as long as the telson; the outer branch consists of two greatly elongated joints which appear somewhat narrow in the side view of the animal but are flattened, the first joint being broader than the second and bearing stout setules in slight serrations along one margin, the other margin being almost free from setæ; the second joint has few setæ on its margins but a distinct tuft of long hairs at the extremity. The inner branch is very small, slightly broadened, and bears a few setules at the extremity.

The telson is cleft to the base, each half oval with a distinct spinule at about the middle of the outer margin, another of about the same size at the outer portion of the extremity with a minute setule nearer the median line.

The two species *Niphargus philippensis* and *N. chilensis* agree in two points in which they differ somewhat markedly from the generic diagnosis of *Niphargus* as given by Stebbing, namely:

1. The inner lobe of the first maxilla is large and broad and bears many plumose setæ.

2. The second gnathopod is larger than the first, and differs considerably from it in shape.

In his generic diagnosis Stebbing⁽⁴⁾ (p. 405) says: "Maxilla 1, inner plate with few (2 or 3) setæ" and "Gnathopods 1 and 2 similar." In *N. pulchellus* [Sayce⁽³⁾ (p. 152)] from Australia the inner plate of the first maxilla is broad and with numerous setæ, but in that species the first and second gnathopods are similar and subequal. The gnathopods in *N. chilensis* and *N. philippensis* present a rather striking resemblance to those of *Phreatogammarus propinquus* Chilton from New Zealand⁽²⁾ (p. 84), and also resemble those of *Metacrangonyx longipes* Chevreux⁽¹⁾ (p. 27), found in the Balearic Isles, more than they do those of typical species of *Niphargus*. In *Phreatogammarus* and in *Metacrangonyx* the third uropods are, however, very different from those of *Niphargus*, being elongated with equal branches in *Phreatogammarus*, and very short with inner branch vestigial in *Metacrangonyx*. The third uropods are, however, subject to much modification in all subterranean species, and possibly the gnathopods are more trustworthy as evidence of relationship than the variable terminal uropods.

Niphargus philippensis, although resembling *N. chilensis* in the first maxilla, the shape of the gnathopods and particularly in the setose character of the ischium of the first gnathopod, differs in the following points, most of which have already been mentioned, namely:

1. In the absence of eyes.
2. In the different shape and size of the branchiæ.
3. In the shape of the first antenna, especially in the second joint of the peduncle and the long thickened flagellum.
4. In antenna 2, the joints of the flagellum being distinct and not fused as in *N. chilensis*.
5. In the broadened basal joints of peræopods 1 and 2.
6. In the basal joint of the fifth peræopod, which is normal and not greatly enlarged, while in *N. chilensis* the basal joint may be very large and longer than all the succeeding ones. In *N. chilensis*, too, the joints of the three posterior pairs of peræopods show a greater tendency to be broadened, the merus especially so.
7. In the third uropods, which are more elongated in *N. philippensis* and not quite so broad in proportion as *N. chilensis*.

An examination of the different specimens of *Niphargus philippensis* shows that there is considerable variation in the length

and thickness of the flagellum of the first antenna, the length and thickening of the joints of the fifth peræopod, and in the length of the third uropods. The special characters of these appendages appear to be attained only in adult specimens and possibly they are more marked in the males than in the females.

In *Niphargus chilensis* the parts that are similarly subject to special development seem to be the peduncle of the first antenna, the propod and dactyl of the second gnathopod, and the fifth peræopod.

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ILLUSTRATIONS

(All the figures refer to *Niphargus philippensis* sp. nov.)

PLATE 1

- FIG. 1. Side view of whole animal.
2. Peduncle of first antenna.
3. Second antenna.
4. Upper lip.
5. Mandible, showing palp, etc.
6. Mandible, showing cutting edge, molar tubercle, etc.
7. Lower lip.
8. First maxilla.
9. Second maxilla.

PLATE 2

- FIG. 10. Maxilliped; 10a, terminal joints of same.
11. First gnathopod.
12. Second gnathopod.
13. First peræopod.
14. Third peræopod.

PLATE 3

- FIG. 15. Fifth peræopod.
16. First uropod.
17. Second uropod.
18. Third uropod.
19. Third uropod, basal joint and inner branch.
20. Telson.
21. Pleon and uropoda, side view.

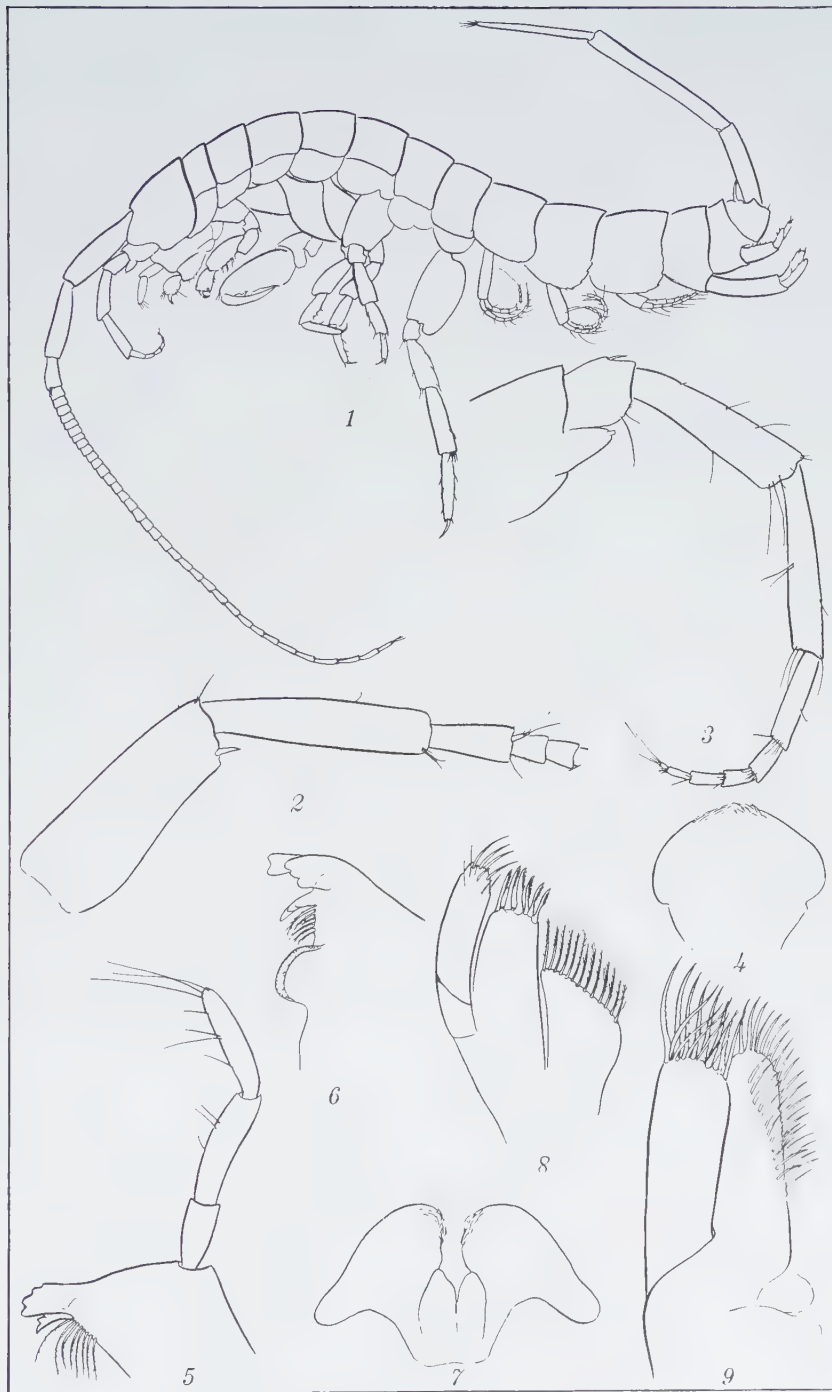


PLATE 1. *NIPHARGUS PHILIPPENSIS* SP. NOV.

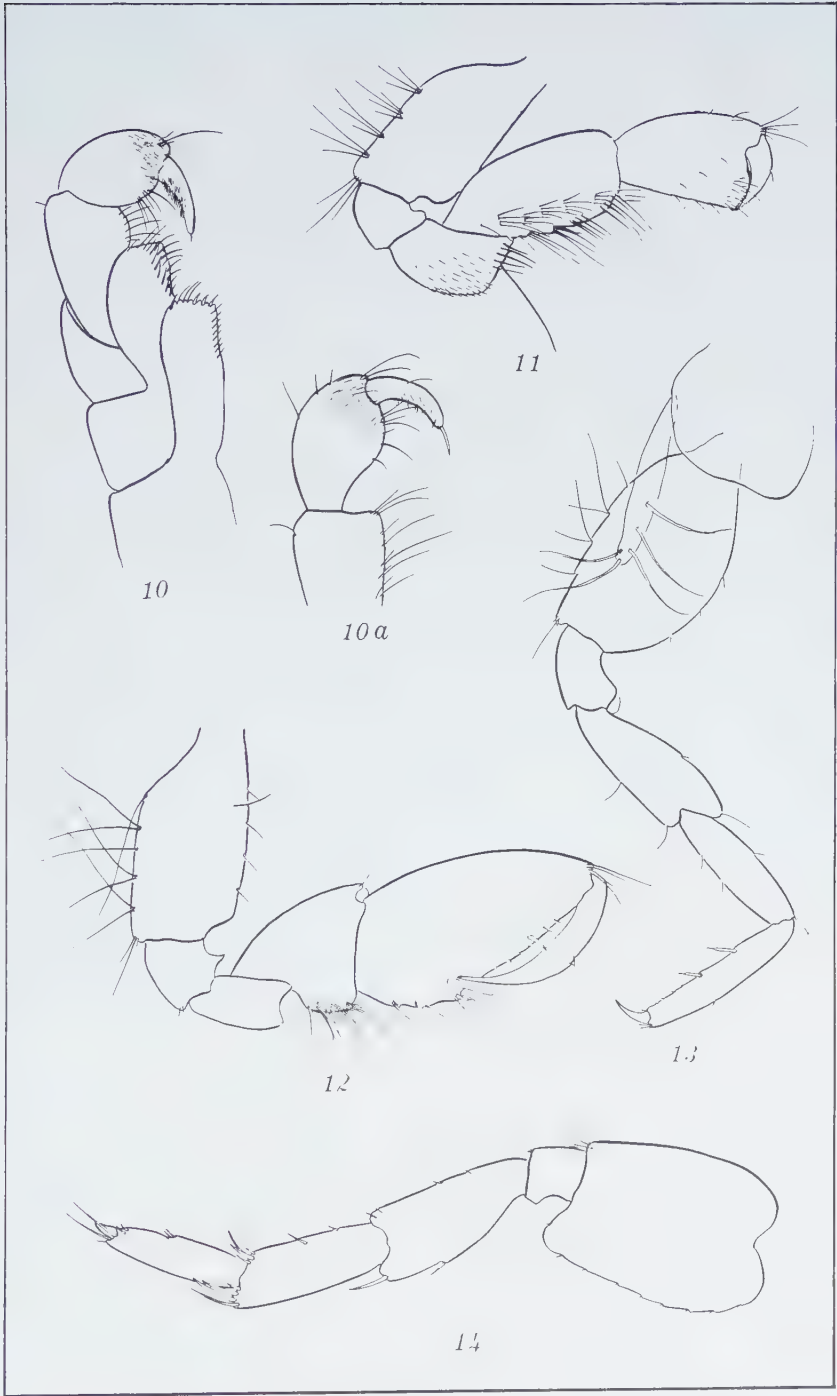


PLATE 2. NIPHARGUS PHILIPPENSIS SP. NOV.

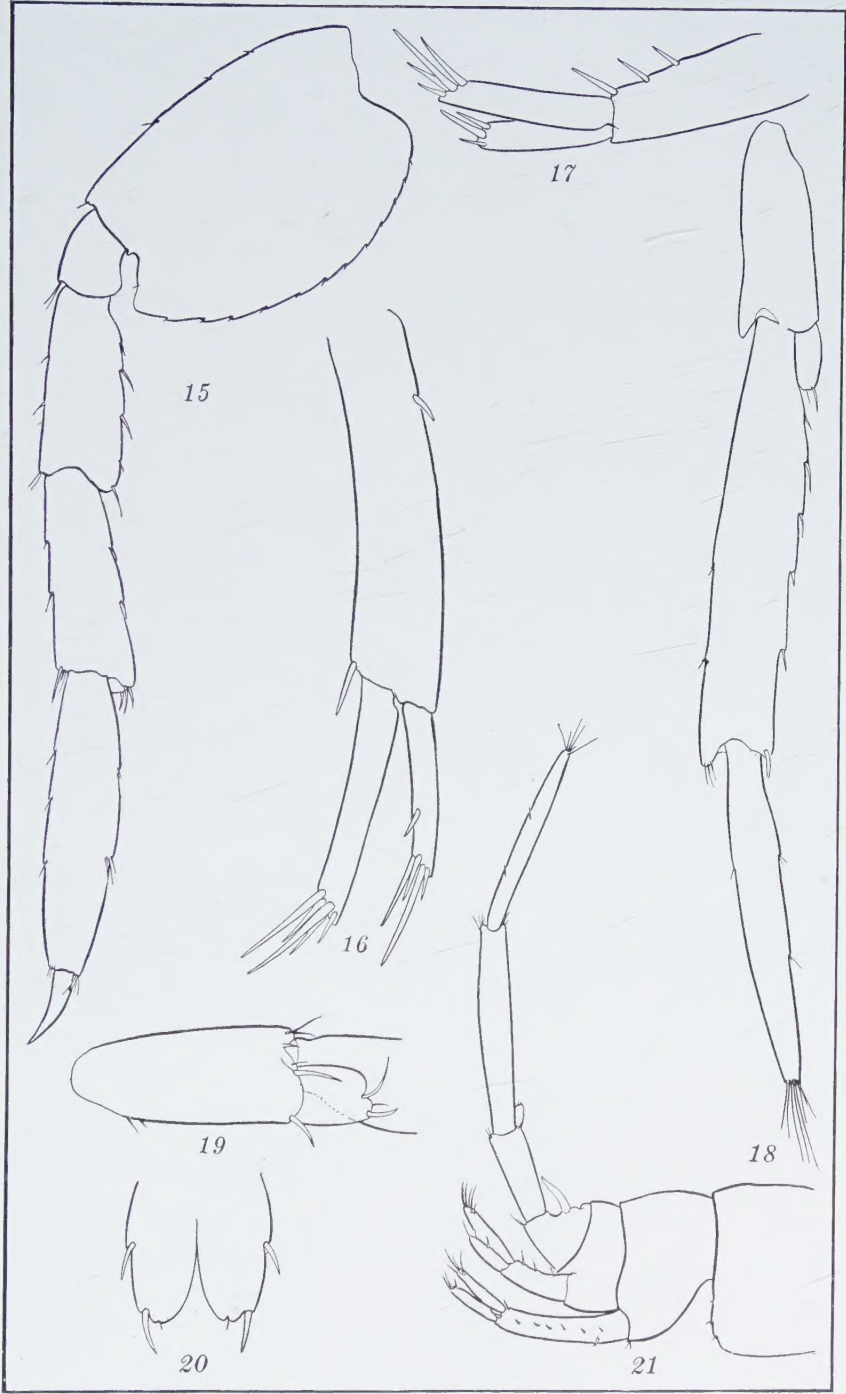


PLATE 3. NIPHARGUS PHILIPPENSIS SP. NOV.

REVIEW

The | Medical Clinics | of | North America | January, 1920, | published
bi-monthly by | W. B. Saunders Company | Philadelphia and London
| Paper, pp. 849-1165. \$12 per year.

The Boston Number, Volume 3, No. 4, contains the following papers:

Defects in membranous bones, exophthalmos and diabetes insipidus; an unusual syndrome of dyspituitarism, by Henry A. Christian.

Diabetes of long duration. Severe diabetes versus severe acidosis in diabetes, by Elliott P. Joslin.

Pericarditis, by William H. Robey.

Malignant disease of the lungs probably secondary to a hypernephroma of the kidneys, by Edwin A. Locke.

Studies in food poisoning—an experimental lunch with canned food containing bacteria, by M. J. Rosenau.

Vascular hypertension, by James P. O'Hare.

Gout, by C. W. McClure.

Two cases with chronic gastro-intestinal symptoms. Comments on the use of transfusion in pernicious anemia, by George R. Minot.

Certain types of pneumonia and serum treatment, by Frederick T. Lord.

The diagnostic value of electrocardiography of hearts beating regularly, by Paul D. White.

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Surgical anesthetics in diabetes mellitus, by Reginald Fitz.

Whooping-cough, by Fritz B. Talbot.

The treatment of the psychoneuritic, by Stanley Cobb.

Laboratory diagnosis, by Lesley H. Spooner.

